

**WORLDWIDE EMERGING ENVIRONMENTAL ISSUES
AFFECTING THE U.S. MILITARY**

BY

THE MILLENNIUM PROJECT

FOR

THE U.S. ARMY ENVIRONMENTAL POLICY INSTITUTE

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Summarizing Environmental Security Monthly Scanning
July 2010—January 2011

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INTRODUCTION

The purpose of this study is to assess worldwide environment-related issues in order to identify and analyze events that might have environmental security implications, and/or trigger future international environmental treaties or modifications to the existing ones, with potential implications for the military.

The Millennium Project defines environmental security as environmental viability for life support, with three sub-elements:

- preventing or repairing military damage to the environment
- preventing or responding to environmentally caused conflicts
- protecting the environment due to its inherent moral value.

This report presents a summary of recent events and emerging environmental security-related issues organized around this definition. About 200 items have been identified since July 2010, and over 2,000 items since this work began in August 2002. For a complete version of the reports organized by months, see the Army Environmental Policy Institute web page <http://www.aepi.army.mil/reports/>.

* * *

Key environmental and resource constraints, including health risks, climate change, water scarcity and increasing energy needs will further shape the future security environment in areas of concern to NATO and have the potential to significantly affect NATO planning and operations.

Active Engagement, Modern Defence. Strategic Concept for the Defence and Security of the Members of the North Atlantic Treaty Organisation adopted by Heads of State and Government in Lisbon. 19 Nov. 2010

While climate change alone does not cause conflict, it may act as an accelerant of instability or conflict, placing a burden to respond on civilian institutions and militaries around the world.

2010 Quadrennial Defense Review
United States Department of Defense

1. ENVIRONMENTAL SECURITY MONTHLY SCANNING ITEMS

A. Preventing or repairing military damage to the environment

ENVIRONMENTAL SECURITY RISES ON THE INTERNATIONAL POLITICAL AGENDA

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International Biosecurity Initiative
Synthetic Biology Guidelines to Reduce Bioweapon Threats

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EU to Set Resource Efficiency Targets
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Evolution of Environmental Management Philosophy in China

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Indigenous People Demanding Regulations for Addressing Climate Change and Mining

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Natural Resources Fuel Violence in Eastern D.R. Congo
Protests in Peru over Dam Irrigation and Hydroelectric Project Part of a Regional Picture
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Entered into Force on July 11, 2010
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Chemicals and other Hazardous Compounds

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Germany publishes criteria for substances of very high concern

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Synthetic Biology Guidelines to Reduce Bioweapon Threats
The EU Strengthens Legislation to Counter Cybercrime

Pollution

New EU Directive on Industrial Pollution

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UN Resolution Acknowledges Access to Clean Water and Sanitation a Human Right
UN Human Rights Council Affirms Right to Water as Legally-Binding
European Parliament Resolution on Jordan River Water Management Reform

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World's Humid Tropical Forests to Suffer Considerable Biodiversity Change by 2100
Biosafety Regulations Reviewed in Context of Worrying Forecasts
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Chemical and Biological Safety

International Biosecurity Initiative
Synthetic Biology Guidelines to Reduce Bioweapon Threats
New Regulations for Chemicals in California

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Biotechnology

Space

India Urges Strengthening Outer Space Treaty

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"Public Interest" Environmental Suits Increasing
International Consortium Created to Curb Environmental Crime
The ICC to Establish an Independent Oversight Mechanism
Strategic Plan for Biodiversity to Connect UN Conventions and UN Bodies
UN Review of Sustainable Development in Preparation for Rio+20 in 2012
International Atomic Fuel Banks to Reduce Nuclear Proliferation
Prosecution of Pillage of Natural Resources as War Crime
Regional Cooperation in Africa to Counter Wildlife Trafficking
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Shipping Efficiency Database to Reduce Emissions from Maritime Transportation

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Revised Standards Proposed for Corporate Greenhouse Gas Reporting
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1. ENVIRONMENTAL SECURITY MONTHLY SCANNING ITEMS

A. Preventing or repairing military damage to the environment

ENVIRONMENTAL SECURITY RISES ON THE INTERNATIONAL POLITICAL AGENDA

NATO's New Strategic Concept Includes Environmental Security

“Key environmental and resource constraints, including health risks, climate change, water scarcity and increasing energy needs will further shape the future security environment in areas of concern to NATO and have the potential to significantly affect NATO planning and operations”, reads NATO’s new Strategic Concept for the next decade, adopted at the alliance’s Summit meeting in Lisbon, November 2010. The new roadmap was updated considering modern threats such as energy security, cyber attacks, and the security impacts of emerging technologies, along with and in the context of the spread of terrorism and extremist groups. It stipulates that, “A number of significant technology-related trends – including the development of laser weapons, electronic warfare and technologies that impede access to space – appear poised to have major global effects that will impact on NATO military planning and operations.” In the spirit of enhancing EU-NATO cooperation, an EU-US Working Group on Cyber-security and Cybercrime was established to address specific priority areas, and an agreement on the Terrorist Finance Tracking Program was negotiated. [November 2010. Military Implications, Sources¹]

NATO Continues to Develop Cyber Defense Policies

NATO nations’ Senior National Policy Advisors held a meeting in Brussels, January 25, 2011, assessing ways of using NATO assets and capabilities for further developing the Alliance’s cyber defense policy and common defense system against cyber threats. “There simply can be no true security without cyber security,” noted NATO Secretary General, Anders Fogh Rasmussen, highlighting that this meeting is an “important part of getting ahead of the cyber curve.” Cyber security is also identified as an increasing challenge in NATO’s New Strategic Concept. [January 2011. Military Implications, Source²]

Germany to Propose Adding Climate Change to UN Security Council Agenda

Germany will join the UN Security Council for two years beginning in January as one of ten non-permanent members. During this time it is expected to urge this UN body to begin addressing climate change as a global security threat. This view is shared by many other UN members, as evidence of the security implications of climate change mount, and environmental security is becoming part of the security agenda of states and international security organizations. The UN General Assembly December 15, 2010 session focused on improving the coordination of efforts in case of disasters, including those associated with natural hazards. [Related items: *UK Initiates UN Security Council Debate on Climate Change and Security* in April 2007, and *UN General Assembly Stressed Environment-related Issues* in September 2008 environmental security reports.] [December 2010. Military Implications, Sources³]

Environmental Aspects Should Be Factored More Into Conventional Security Concerns

In a Capitol Hill briefing, defense experts underlined that environmental degradation and the fight for natural resources threaten U.S. security in the 21st century, as depletion of resources exacerbates political instability and conflict in the developing world, increasing the number of failed states. Therefore, integrating environmental problems into security policy is essential and should be on a par with conventional security aspects. For many defense officials in developing countries, security is seen in terms of food, water, and environmental security, and natural disasters. Along the same lines, an article on Pakistan questions the justification of funds allocated to conventional security compared to those for human or environmental security. In 2010, Pakistan's defense budget will rise 17%, to \$5.2 billion, while the week of flooding has by far surpassed the devastation of anything the Taliban could accomplish. The article notes that this is a dilemma of much of the developing world, mostly affecting those vulnerable to climate change and disasters. "Without neglecting the very real challenges posed by insurgency, civil war, or external invasion, the time has come to begin shifting resources toward human and environmental security," says the article. [September 2010. Military Implications, Sources⁴]

UN Official Calls to "Securitize the Ground" as part of Human Security

At the Third Annual Caux Forum for Human Security, held July 9-16, 2010, in Caux, Switzerland, Luc Gnacadja, the Executive Secretary of the UN Convention to Combat Desertification (UNCCD), underlining the links between climate change and conflict, called for a "decisive policy change in the way we perceive the drylands and address the issues of its people in order to avoid environmentally induced conflicts." To this end, he suggested the "securitize the ground" concept, in order to create a wider global political awareness of the social, environmental, and economic consequences of desertification, land degradation, and drought. Securitizing the ground is defined in the reference. [July 2010. Military Implications, Source⁵]

International Consortium Created to Curb Environmental Crime

The International Consortium on Combating Wildlife Crime (ICCWC) came into effect, by the signing of a Letter of Understanding by the heads of five organizations: INTERPOL, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the UN Office on Drugs and Crime (UNODC), the World Bank, and the World Customs Organization. In the same spirit, the resolution adopted by INTERPOL's 79th General Assembly, attended by 650 delegates from 141 countries, underlines that environmental crime is "multi-disciplinary in nature due to the complexity and diversity of crime types." Since it is "not restricted by borders and involves organized crime networks...", a global response is needed, with INTERPOL and the National Central Bureaus playing a leading role. The resolution also stipulates that environmental crime impacts the global economy and security, and recommends that INTERPOL form the Environmental Crime Committee. [November 2010. Military Implications, Sources⁶]

Environment-related Issues Dominate the UN General Assembly Debate

The need for increased and coordinated efforts from all countries to address climate change, vulnerability to natural disasters, and threats to biodiversity was the most frequent theme of the speeches of heads of state and governments addressing the UN General Assembly held 23-25

and 27-30 September 2010, and will probably top the 65th session's agenda. [September 2010. Military Implications, Sources⁷]

The UN and African Union to Increase Cooperation for Peace and Security

The UN and the African Union (AU) launched a Joint Task Force on peace and security for improving conflict prevention, peacekeeping, and peacebuilding across the continent (expanding their present efforts in Sudan, Guinea, and Somalia.) The task force will meet twice a year at the senior level to review immediate and long-term strategic issues, and its program of work will be set in coordination with the UN Office to the AU and the AU's Permanent Observer Mission to the UN. The first high-level meeting of the Africa-European Union Energy Partnership was held September 14-15, 2010, in Vienna, Austria, addressing cooperation on energy security and renewable energy issues. The over 300 participants, including ministers and high-level representatives from 24 European and 33 African countries, also agreed upon concrete targets and objectives. [September 2010. Military Implications, Sources⁸]

An Emerging Nordic-Baltic Alliance Might Have Security Implications

The first Nordic-Baltic Summit was held in London, January 19-20, 2011 to establish a regional "alliance" for addressing issues of common interest. The Summit was attended by the leaders of Denmark, Estonia, Finland, Iceland, Latvia, Lithuania, Norway, Sweden, and the host, the UK Prime Minister, David Cameron. Reportedly, one of the outcomes is building an energy "supergrid" to link suppliers of renewable energy. A follow-up summit is planned for Sweden in 2012. Although the Summit's focus was on economic and social issues, speculations are that the alliance will be expanded to security issues. In the meantime, Nordic foreign ministers will hold an April meeting in Helsinki to discuss prospects for a "NATO-type" defense pact to address Arctic-related security issues. Since there are conflicting national jurisdictions over the Arctic, and global warming is expected to open shipping and access to large gas and oil resources, new agreements seem necessary to prevent future conflicts. [January 2011. Military Implications, Sources⁹]

Pacific Region Programs for Addressing Environmental Security

The Pacific Regional Environment Programme (PREP) adopted the Strategic Plan for 2011-2015 at its 21st meeting held in Madang, Papua New Guinea, September 6-10, 2010. It creates a framework for regional environmental cooperation on climate change; biodiversity and ecosystem management; waste management and pollution prevention; and environmental monitoring and governance. The Asian Development Bank's paper, Focused Action: Priorities for Addressing Climate Change in Asia and the Pacific, outlines similar priorities for its work on clean energy, sustainable urban development, land use and forest management for carbon sequestration, climate-resilient development promotion, and strengthening of related policies and institutions. [September 2010. Military Implications, Sources¹⁰]

Project on National Security Reform (PNSR) Vision Working Group Report

The "Project on National Security Reform Vision Working Group" is a 3-year study with over 300 national security experts. It assesses the U.S. national security system, recommending a comprehensive reform agenda to prepare the system to meet the challenges of the 21st century. A

central recommendation was to introduce foresight into the Executive Branch and into the National Security System via the establishment of a Center for Strategic Analysis and Assessment within the Executive Office of the President. [August 2010. Military Implications, Sources¹¹]

Comprehensive Assessment of Environmental Security

Environmental Security: A Guide to the Issues by Elizabeth L. Chalecki is a comprehensive overview of environmental security issues and discourse. It addresses the security implications of shortages and abundance of natural resources, the international ramifications of food security, the social impacts of changes of the global ecosystem due to climate change, and the effects of war and preparation for war on the natural environment. The book also, "...explores how nations can, and must, cooperate with each other to confront and manage these threats." [January 2011. Military Implications, Source¹²]

INTERNATIONAL TREATIES RELATED TO ENVIRONMENTAL SECURITY AND MILITARY ACTIONS

Updates of the Rome Statute Include Amendments on the Crime of Aggression and Expansion of Criminalizing the Use of Certain Weapons in Non-international Conflicts

The first Review Conference on the Rome Statute of the International Criminal Court (ICC) took place in Kampala, Uganda, May 31 June 11, 2010. The Conference reached agreement on the definition of the crime of aggression and the framework for the Court's jurisdiction over this type of crime. In principle, a crime of aggression is committed by a leader who plans or executes an "act of aggression" that constitutes "by its character, gravity and scale" a "manifest violation of the Charter of the United Nations," while an "act of aggression" is the use of armed force in a manner inconsistent with the U.N. Charter, including any of the acts stipulated in UN General Assembly Resolution 3314, which are listed in new Article 8 bis. The activation of the Court's jurisdiction is pending agreement of two-thirds of States Parties, which cannot be taken before January 1, 2017 and one year after the ratification or acceptance of the amendments by 30 states parties, whichever is later.

The criminalization of the use of certain weapons in non-international conflicts is added under Article 8, paragraph 2, e) and includes: poison, poisoned weapons, asphyxiating, poisonous or other gases and all analogous liquids, materials or devices, as well as the use of bullets that expand or flatten in the body. The amendment will enter into force for each State Party one year after depositing the instruments of ratification or acceptance of the amendment. [Related item: *Changes to War Crimes Proposed for the International Criminal Court* in November 2009 environmental security report.]

The Conference also adopted the Kampala Declaration, reaffirming states' commitment to the Rome Statute and its full implementation, as well as its universality and integrity. [July 2010. Military Implications, Sources¹⁴]

UN Resolution Acknowledges Access to Clean Water and Sanitation a Human Right

The UN General Assembly adopted a resolution recognizing access to clean water and sanitation as a human right, a move that might be a step forward towards a future treaty. The non-binding resolution received 122 votes in favor, no votes against, while 41 countries abstained—including

Australia, Britain, Canada, and the U.S. Introducing the resolution, Bolivia's representative pointed out that more children are killed annually by lack of access to water than by AIDS, malaria and measles combined, while lack of sanitation affects 40% of the world's population. [August 2010. Military Implications, Sources¹⁵]

UN Human Rights Council Affirms Right to Water as Legally-Binding

Water tables are falling on all continents; more than 40% of humanity gets its water from watersheds controlled by two or more countries. About 900 million people lack clean water and 2.6 billion lack adequate sanitation. The UN Human Rights Council adopted a resolution affirming that rights to safe drinking water and sanitation are basic human rights contained in existing human rights treaties, and therefore legally binding. The International Covenant on Economic, Social and Cultural Rights (ICESCR), the UN Convention on the Rights of the Child (CRC), the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), and the Convention on the Rights of Persons with Disabilities (CRPD) give rise to obligations for States parties in relation to access to safe drinking water and sanitation. This action addresses previous objections by those nations who abstained from supporting this right in the UN General Assembly in July this year. The UN Human Rights Council calls upon all States to create the legal and procedural frameworks for assuring the implementation, monitoring and enforcement mechanisms "to achieve progressively the full realization of human rights obligations related to access to safe drinking water and sanitation, including in currently unserved and underserved areas." [October 2010. Military Implications, Sources¹⁶]

International Biosecurity Initiative

U.S. Rep. Brad Sherman (D-Calif.), chair of the House Foreign Affairs Subcommittee on Terrorism, Nonproliferation, and Trade introduced the International Biosecurity Act of 2010 (HR 6297) to pursue efforts to establish international cooperation to counter both natural and man-made biological risks and assess the establishment of a global legal regime for biosecurity. The bill might be included in the proposed WMD Prevention and Preparedness Act of 2010 (HR 5498), which is awaiting a House floor vote. [Related items: *BWC Meeting Improves International Resilience Systems to Address Infectious Disease and BioWeapons* in August 2009, *New Technologies Need New Regulations Systems* in March 2009, and other items in previous environmental security reports.] [October 2010. Military Implications, Sources¹⁷]

Synthetic Biology Guidelines to Reduce Bioweapon Threats

Synthetic biological voluntary guidelines released October 13, 2010 by the U.S. Dept. of Health and Human Services call for sellers of synthetic double-stranded DNA products to know their buyers and their intended use. These guidelines will be reviewed and updated on a regular basis. Since synthetic biology could one day be misused to create bioweapons and potentially even weapons of mass destruction, international agreements to regulate this new technology seem both likely and warranted. The scale and scope of the expected future biological revolutions may one day require an international regulatory agency similar to the International Atomic Energy Agency. [October 2010. Military Implications, Source¹⁸]

CONFLICT AND POST-CONFLICT ENVIRONMENTAL SECURITY ISSUES

High cancer rates in Fallujah, Iraq; New Study Raises Questions on Environmental Damage from Bombardments

A paper by visiting professor Dr Chris Busby at the University of Ulster and colleagues reports a four-fold increase in all cancers and a 12-fold increase in childhood cancer in under-14s from a survey in Fallujah, Iraq which was heavily bombarded in 2004. The study showed that infant mortality in the city is more than four times higher than in Jordan and eight times higher than in Kuwait. There is a 38-fold increase in leukemia, and a ten-fold increase in female breast cancer. The changes cannot be ascribed to any specific cause, but the authors raise the possibility of uranium-tainted weapons being involved. [Related item: *New Legal Proceeding over Allegations of Use of Illegal Weapons in Iraq* in May 2010 environmental security report.] [July 2010. Military Implications, Sources¹⁹]

Measuring Progress in Conflict Environments: A Metrics Framework

Measuring Progress in Conflict Environments (MPICE): A Metrics Framework is “a hierarchical metrics system of outcome-based goals, indicators, and measures, useful to indications of trends toward the achievement of stabilization goals over time”. The approach shows a different way to measure conflict, based on outcomes in terms of success or failure results of strategies and projects aimed to strengthen stability and build a self-sustaining peace, instead of assessing traditional output such as the number of schools built, miles of roads paved, or numbers of police trained. MPICE provides a “system of metrics that can assist in formulating policy and implementing strategic and operational plans to transform conflict and bring stability to war-torn societies” by establishing “realistic goals, bringing adequate resources and authorities to bear”. The framework is aimed at analyzing the peace progress during stabilization and reconstruction in order to measure the drivers of violent conflict that prevent indigenous institutions from exiting the conflict peacefully. The MPICE system was tested in Afghanistan and Sudan, and it is currently being applied to crisis cases and will be applied to future ones, in order to improve the approach. It was developed by a consortium of organizations working in development, security, and policy. [July 2010. Military Implications, Source²⁰]

Economic Argument for Peace-building in Sudan

A recent publication by Frontier Economics suggests that the January 2011 Southern Sudanese referendum on independence could cost Sudan, regional neighbors, and international agencies more than \$100 billion over 10 years (and over \$800 billion in 25 years), if the vote results in civil war. The study looks at different conflict scenarios within varying baseline contexts; assessing economic outcomes of impacts on infrastructure, oil production, peacekeeping, and humanitarian aid. [November 2010. Military Implications, Sources²¹]

Artillery Training Charges Pose Environmental Asbestos Threat

The Australian Department of Defence has launched an investigation into the possible exposure of troops to white chrysotile asbestos from a broken dummy charge bag used in a kit for 105mm howitzer training, imported from the U.S. [July 2010. Military Implications, Source²²]

NATIONAL AND REGIONAL INITIATIVES AFFECTING MILITARY ACTIVITIES

Latin American Initiatives for Environmental Security

UNDP and Ecuador have signed an agreement establishing a trust fund to partially compensate the nation for not exploiting an estimated 846 million barrels of crude oil lying under the Yasuni National Park, designated a World Biosphere Reserve in 1989. Costa Rica is also promoting several programs for sustainable energy generation and reforestation aiming to achieve “carbon neutrality” by 2021. Brazil and the U.S. arranged a debt for stewardship arrangement whereby \$21 million in debt will be forgiven in exchange for Brazil protecting non-Amazonian tropical forests. A summary of the consultations across the region are presented in the UNDP LAC Regional Biodiversity Initiative Bulletin, Vol. 1 No. 7, of August 27, 2010. [Related item: *UN and Governments of Latin America and the Caribbean Met to Improve Disaster Anticipation and Response System* in September 2008, and *EU, Latin American and Caribbean Countries Environment Cooperation* in March 2008 environmental security reports.] [August 2010. Military Implications, Sources²³]

First U.S.-Russian Environmental Protection Park

The first U.S. Russian joint environmental protection project is creating the Beringia international conservation park, which will stretch over millions of hectares of Chukotka and Alaska (the Russian side alone might be about 1.8 million hectares.) [August 2010. Military Implications, Source²⁴]

CEC’s Five-year Strategic Plan Increases North-American Environmental Integration

The annual meeting of the Council of the Commission for Environmental Cooperation (CEC), and consultation with the Joint Public Advisory Committee (JPAC) and the public, held in Guanajuato, presented the CEC’s proposed Strategic Plan for 2010–2015. The strategy refocuses the CEC towards a results-centered collaboration between Canada, Mexico and the U.S. on three environmental priorities: 1) healthy communities and ecosystems (which includes management of chemicals of concern); 2) climate change – low-carbon economy (focusing on improving the comparability of data on greenhouse gas emissions, as well as sharing climate change information and adaptation strategies among the three countries); and 3) greening the economy in North America (that includes e-wastes movement within North America and beyond.) The Council also decided to establish the North American Partnership for Environmental Community Action (NAPECA) as a 5-year grant program supporting partnership-building to improve environmental conditions at the community, local and regional levels. [Related item: *Canada, Mexico, and the USA Met to Strengthen Regional Environmental Regulations* in June 2009 environmental security report.]

In the meantime, Health Canada published the Report on Human Biomonitoring of Environmental Chemicals in Canada, an assessment of the levels of 91 chemicals in Canadians. The report presents the results of Cycle 1 of the Canadian Health Measures Survey—a monitoring and research effort assessing chemical exposure. Cycle 2 (2009-2011) is currently being implemented, and planning already began for Cycle 3 (2012-2014). On another related issue, beginning in 2011, the USEPA will require operators of large carbon-emitting operations to submit annual emissions reports for GHGs. General standards are needed for data gathering

and monitoring at federal as well as continental level to fulfill CEC's program. [August 2010. Military Implications, Sources²⁵]

EU to Set Resource Efficiency Targets

The European Commission is preparing a "roadmap" in the form of a set of resource efficiency targets to be published at mid-2011. It is expected that member states will be required to limit their consumption of fuels, minerals, and water, among other resources, potentially linked to the "European Semester" system for monitoring member state budgets. [Related item: *European Climate and Energy Package Formally Adopted* in April 2009 environmental security report.] [January 2011. Military Implications, Source²⁶]

Islamic Conference of Environmental Ministers Approves Detailed Program

Participants to the 4th Islamic Conference of Environment Ministers (ISESCO) adopted a comprehensive Islamic Environmental Programme and endorsed the broader implementation of the program by all Islamic countries. Programs were also adopted for development and implementation of renewable energy, environmental protection, water resources, and sustainable development, as well as for reinforcing member states' capacities to develop national strategies and emergency plans to cope with natural disasters. [October 2010. Military Implications, Sources²⁷]

Evolution of Environmental Management Philosophy in China

The paper *The Evolution of Environmental Management Philosophy Under Rapid Economic Development in China* published in *AMBIO: A Journal of the Human Environment*, seems to be a comprehensive assessment of China's approach to environmental matters, mainly from an energy needs point of view. [January 2011. Military Implications, Source²⁸]

TECHNOLOGICAL ADVANCES WITH ENVIRONMENTAL SECURITY IMPLICATIONS

Computer Technology and Robotics

[Nanowire Semiconductors for Nano-sensors and Nano-robotics](#)

[New Super-efficient Undersea Marine Research Robot](#)

[Cost-Effective Real-Time Electronic Monitoring for Coastal Ecosystems](#)

Nanowire Semiconductors for Nano-sensors and Nano-robotics

Zinc oxide has been used to create a transistor utilizing the piezoelectric effect (mechanical motion inducing voltage) that can process logic operations through its interface with the ambient environment. No external electric signal is required to operate the nanotech processor gate. George Institute of Technology scientists who developed it claim that the technology can be joined with sensors and energy-drawing components to create, "self-sustainable, all-nanowire-based, multifunctional self-powered autonomous intelligent nanoscale systems." [August 2010. Military Implications, Sources³⁰]

New Super-efficient Undersea Marine Research Robot

Engineers at the Monterey Bay Aquarium Research Institute in Moss Landing CA have announced a highly efficient autonomous underwater vehicle that is fast, capable of carrying instruments and also designed for long-term expeditions. The LRAUV (long-range AUV) runs on batteries and incorporates power-saving and internal control software allowing it to monitor its own energy use and make intelligent choices about how to pursue its mission. The robot is claimed to be flexible enough for inclusion in most scientific excursions and is designed to work as a member of a group. The next phase of MBARI experimentation will monitor marine ecology using two units. [November 2010. Military Implications, Source³¹]

Cost-Effective Real-Time Electronic Monitoring for Coastal Ecosystems

Researchers from North Carolina State University led by Prof. Alex Dean report developing a “cost-effective electronic monitoring system that will enable researchers to advance ... understanding of critical coastal ecosystems by allowing users to track water-quality data ... in real time.” The system uses inexpensive, wireless sensors that can be anchored to the seabed, moored to buoys, or towed behind vessels to collect data, which is then transmitted to a central server. This project is "open source" and should enable other institutions concerned with coastal environments to develop their own efforts more efficiently. [November 2010. Military Implications, Source³²]

New Detection and Cleanup Techniques

[Novel Micro-enabling Technology Potentials to Improve Detection Efficiency](#)
[DNA Backbone Provides Foundation for Sensitive New Multi-material Sensor](#)
[U.S.-China Ozone Microbubbles Provide Widely Applicable Cleanup Technique](#)
[Laser Detector Offers Fast Gas Analysis](#)
[New Colorimetric Sensor Uniquely Detects Vapor from TATP Explosive](#)
[Spectrometer Provides Accurate Beta/Gamma Detection in 15 Minutes](#)
[Molecular Imprinted Polymers Provide Basis for Sensors of Multiple Compounds](#)
[Russian Enterprise to Mass Produce Low Cost Detectors for More than 40 Substances](#)
[Flexible Supercapacitor Could Power Wearable Environmental Sensors](#)
[Marine Bacteria Which Can Metabolize Steel Discovered](#)
[Improved Method to Remove Pollutants from Gas and Liquids](#)
[Nano-based Olfactory Sensor Offers Diversity, Extreme Miniaturization](#)
[New Index Aids Characterization of Biological Reaction to Nanomaterials](#)
[Autonomous Network of Sea Skimmers Could Speed Oil Spill Cleanup](#)
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[Photocatalytic Pavement Removes Nitrogen Oxides from City Air](#)
[New Water Testing and Purification Technologies](#)
[Electrified Nanotube-Fabric Filter Offers Cheap, Fast Water Purification](#)
[Graphene-based Composite Removes Arsenic from Drinking Water](#)
[New Catalyst Enables Water Decontamination by Visible Light](#)
[Adding Flocculation Agents to Runoff Filter Socks Improves Performance](#)

Novel Micro-enabling Technology Potentials to Improve Detection Efficiency

Sphere Fluidics, a University of Cambridge spin-out company, states that the use of, “...an integrated microfluidics and picodroplets system for rapid analysis, isolation and discovery of single (and small populations of) cells and molecules...”, offers efficiency, control and automation advantages to existing systems of analysis and detection. Applications to energy, health, and chemical investigation are anticipated and in progress. [Related item: *New Substrate Preparations Make for Inexpensive “Labs on a Chip”* in October 2008 environmental security report.] [November 2010. Military Implications, Sources³⁴]

DNA Backbone Provides Foundation for Sensitive New Multi-material Sensor

Prof. Eric Kool of Stanford Univ., Stanford, CA, and colleagues report sticking small sets of sensitive fluorescent detector compounds onto short strands of one of the two long parallel chains of sugar and phosphate molecules forming the backbone of DNA to produce a new, highly effective sensor for organic vapors. The DNA structure provides an ideal framework in which the sensing molecules can react with the target and with each other to produce the indicative effects. Changing the identity and sequence of the attachments along the chain produced different fluorescence patterns for the test materials. This raises the possibility of combining a number of such units into a versatile sensing system for environmentally significant components. [August 2010. Military Implications, Sources³⁵]

U.S.-China Ozone Microbubbles Provide Widely Applicable Cleanup Technique

Prof. Andy Hong of the University of Utah has developed a technology, “heightened ozonation treatment (HOT)” that is claimed to have the potential to aid a wide range of environmental cleanup efforts, such as removing oil and gas byproducts from water, and organics and heavy metals from industrial sites, and removing harmful algae from lakes. The University, in cooperation with the Chinese company Honde LLC and the Chinese government, is testing the technique to remediate a lakeshore industrial site. [October 2010. Military Implications, Source³⁶]

Laser Detector Offers Fast Gas Analysis

Scientists at the JILA laboratory operated by the National Institute of Standards and Technology (NIST) and the University of Colorado at Boulder report having extended into the mid-infrared (IR) range the coverage of a laser-based spectroscopic system capable of fast molecular analysis of complex gas mixtures, with parts-per billion (ppb) precision, using an “optical frequency comb.” The researchers plan to extend this coverage to an important longer wavelength portion of the IR spectrum. [October 2010. Military and Implications, Source³⁷]

New Colorimetric Sensor Uniquely Detects Vapor from TATP Explosive

Prof. Kenneth Suslick and Hengwei Lin of the University of Illinois at Urbana-Champaign claim development of a fast, inexpensive colorimetric sensor array device that can quantitatively detect levels of vapor from the explosive triacetone triperoxide (TATP) down to 2 ppb. TATP is a high-powered explosive that has been used in several bombing attempts. The sensor uses an inert plastic film with 16 tiny colored dots – each a different pigment – where a solid acid catalyst breaks down TATP into detectable components that cause the pigments to change color in an

indicative pattern. It is being commercialized by iSense, a sensor manufacturer based in Palo Alto CA. [October 2010. Military Implications, Sources³⁸]

Spectrometer Provides Accurate Beta/Gamma Detection in 15 Minutes

Profs. David Hamby and Abi Farsoni of Oregon State Univ. have announced development of a new type of radiation spectrometer that can take as little as 15 minutes to determine the type and amount of beta- and gamma-emitting radionuclides present in materials such as soil. The development will be commercialized by Avicenna Instruments, of Corvallis, Oregon. [January 2011. Military Implications, Source³⁹]

Molecular Imprinted Polymers Provide Basis for Sensors of Multiple Compounds

Prof. Rigoberto Advincula and colleagues of the Depts. of Chemistry, and Chemical and Biomolecular Engineering at the Univ. of Houston, are developing a family of sensors based on molecular imprinted polymers, which can be tailored to show an affinity for certain chemicals. These materials, prepared by electropolymerization directly on a gold surface, can form the basis for sensitive detectors for hazardous compounds in the environment. [January 2011. Military Implications, Sources⁴⁰]

Russian Enterprise to Mass Produce Low Cost Detectors for More than 40 Substances

The Russian firm Neutron Technologies has received funding for a project that will mass produce detectors of explosives and narcotics, using labeled neutron technology. The detectors are designed to operate in any kind of surroundings, can identify more than 40 different kinds of explosives, narcotics, and highly toxic substances, and are claimed to be significantly less expensive and more effective by numerous measures than other countries' offerings. [December 2010. Military Implications, Source⁴¹]

Flexible Supercapacitor Could Power Wearable Environmental Sensors

Prof. Zhong Lin Wang of the Georgia Inst. of Technology and Jong Min Kim of South Korea's Samsung Electronics claim development of a prototype flexible supercapacitor that can be incorporated into textiles. The devices use zinc oxide nanowires as electrodes. Combined with their previously developed flexible fiber nanogenerators, these units could power wearable environmental sensors. [January 2011. Military Implications, Source⁴²]

Marine Bacteria Which Can Metabolize Steel Discovered

A new species of bacteria was discovered corroding the Titanic. The newly identified species, while potentially dangerous to vital underwater installations such as offshore oil and gas pipelines, could also offer a new way to recycle iron from old ships and marine structures, according to the researchers from Dalhousie University in Halifax NS, Canada, and Seville University in Spain. Evidence for this species of marine bacteria originated with investigation into strange formations, referred to as "rusticles", found on the underwater wreckage of the Titanic, hence the name designation of *Halomonas titanicae*. In the context of marine bioremediation and recovery of recyclable metals, this discovery provides yet another avenue of investigation into these types of metabolic processes, and the potential organisms (naturally

occurring and genetically engineered) utilizing them. [December 2010. Military Implications, Source⁴³]

Improved Method to Remove Pollutants from Gas and Liquids

University of Illinois researchers led by Prof. Mark Rood have created a continuous process for the creation of tailorable carbon/iron-based catalysts. The technology uses ultrasonic spray pyrolysis, also developed at the University, to produce porous carbon spheres with iron nanoparticles dispersed throughout, differentiating it from previous processes which typically provided only one ingredient or the other. The group will now work on developing catalysts to remove three bioaccumulating pollutants from gas streams simultaneously; where now such pollutants are addressed individually. [December 2010. Military Implications, Source⁴⁴]

Nano-based Olfactory Sensor Offers Diversity, Extreme Miniaturization

Prof. Andrei Kolmakov, of the Physics Dept. at Southern Illinois Univ. at Carbondale, and colleagues, have announced developing a chemical sensing device (an "electronic nose") based on a wedge-like nanowire (nanobelt) of tin dioxide in a new structural configuration providing multiple sensitivities in a single wire. Ultimate sizes for the devices could be in the range of micrometers. [August 2010. Military Implications, Sources⁴⁵]

New Index Aids Characterization of Biological Reaction to Nanomaterials

Prof. Xin-Rui Xia and colleagues at NC State University have published a method for predicting how biological proteins will react with nanoparticles of given compositions. According to their paper's abstract, "The method successfully predicted the adsorption of various small molecules onto carbon nanotubes,... the nanodescriptors were also measured for 12 other nanomaterials ... [and] can be used to develop pharmacokinetic and safety assessment models for nanomaterials." [August 2010. Military Implications, Sources⁴⁶]

Autonomous Network of Sea Skimmers Could Speed Oil Spill Cleanup

According to an article in Nanowerk News, the SENSEable City Laboratory at MIT has developed one prototype unit of a proposed fleet, Seaswarm, of autonomous solar-powered robot vessels, each of which moves a conveyor belt covered with a thin absorbent nanowire mesh over the sea surface to remove oil. The fabric can absorb up to twenty times its own weight in oil while repelling water. By heating the material, the oil can be removed and the nanofabric reused. The "swarm" would use GPS and a communications network to self-manage a coordinated attack on a spill. [September 2010. Military Implications, Source⁴⁷]

New Technique Provides Simple, Sensitive Analysis of Aerosols

Dr. Patrick Roach and colleagues at DOE's Pacific Northwest National Laboratory, Richland WA, have announced a new technique, Nanospray-Desorption/Electrospray Ionization (NanoDESI) for introducing aerosols into a mass spectrometer for detailed analysis of their molecular content. This single, generally applicable method, unlike former ones, does not require expert technicians or significant sample preparation. [September 2010. Military Implications, Sources⁴⁸]

Photocatalytic Pavement Removes Nitrogen Oxides from City Air

F. C. Nüdling Betonelemente of Fulda, Germany, has developed the "Air Clean" nitrogen oxide-reducing paving slab, which is coated with photocatalytic titanium dioxide nanoparticles that convert harmful substances such as nitrogen oxides into nitrates that are harmlessly washed away. One test, in Erfurt, indicated an average degradation rate of 20% for NO₂ and 38% for NO. [August 2010. Military Implications, Source⁴⁹]

New Water Testing and Purification Technologies⁵⁰

Scientists at the Univ. of Central Florida, led by Prof. J. Manuel Perez, have developed a fast, sensitive, and probably less expensive test for cholera toxin in water. The test uses the sugar dextran coated with iron oxide nanoparticles, with a positive result detected by magnetic relaxation measurements.

ABSMaterials, Inc. of Wooster, OH is offering water purification systems based on the properties of a new swellable nano-structured glass, Osorb®, developed at the College of Wooster. In a demonstration, the material expands to eight times its original volume in the presence of hydrocarbons, purifying a gasoline-tainted sample of drinking water for consumption. [January 2011. Military Implications, Sources⁵¹]

A new disposable filter that looks like a tea bag and fits into the neck of a bottle reportedly can clean highly polluted water. The inside of the tea bag material is coated with a thin film of biocides, encapsulated within nanofibers, which kill pathogenic microbes. The bag is filled with active carbon granules that remove all harmful chemicals, e.g., endocrine disruptors. According to the developers, each "tea bag" filter can purify one liter of the most polluted water to the point where it is 100% safe to drink. It is discarded after use. The invention was developed by a team of scientists led by Prof. Eugene Cloete, Dean of the Faculty of Science at Stellenbosch Univ. in South Africa, and is one of the first major projects of the new Stellenbosch Univ. Water Institute.

A team of researchers at Stanford University, Stanford CA, have demonstrated a new water purification technique in which water flows thru electrified (-20 V) cotton cloth dyed with ink containing bactericidal silver nanowires and carbon nanotubes. The electric potential greatly improves the effectiveness of the nanosilver. The high-speed process de-activates 80-90% of the bacteria, but multiple units could be cascaded to produce acceptable reductions, or the device could be used as a preprocessor for other purification systems, reducing their bacterial load.

The *International Journal of Nuclear Desalination* article *Nanotechnology for water purification* offers an overview of nanotech-based devices for water treatment. According to the abstract, "[n]ew sensor technology combined with micro and nanofabrication technology is expected to lead to small, portable and highly accurate sensors to detect chemical and biochemical parameters in water. Potential opportunities and risks associated with this technology are also highlighted." [August 2010. Military Implications, Sources⁵²]

Electrified Nanotube-Fabric Filter Offers Cheap, Fast Water Purification.

The abstract of a research paper by Prof. Yi Cui of the Dept. of Materials Science and Engineering at Stanford University and colleagues states that an inexpensive, fast acting electrical water purification system has been developed using silver nanowires and carbon nanotubes on a cotton base. This operates at 100,000 L/(h × m²) and can deactivate >98% of

bacteria within several seconds. The deactivation is achieved by large electric field concentrations near the silver nanowire tips. [December 2010. Military Implications, Sources⁵³]

Graphene-based Composite Removes Arsenic from Drinking Water

Researchers at Pohang University of Science and Technology in Pohang, Republic of Korea, claim creation of a new magnetite composite, based on reduced graphene oxide (RGO), which absorbs arsenic when dispersed in water, and can then be removed with a magnet. Compared to present methods, the highly efficient new material can be used in continuous-flow systems for longer periods. [July 2010. Military Implications, Sources⁵⁴]

New Catalyst Enables Water Decontamination by Visible Light

Scientists at the Shenyang National Laboratory for Materials Science in Shenyang, China, have announced a catalytic water purification technique using visible light rather than UV. The catalyst is made from a grid of titanium oxide fibers impregnated with nitrogen, augmented with palladium nanoparticles. The bactericidal action continues for up to 24 hours after light is removed. Professor Shang has stated that this new technique is both more energy-efficient and more effective than previous UV photocatalysts and will also kill some of the toughest microbes such as spores. [July 2010. Military Implications, Sources⁵⁵]

Adding Flocculation Agents to Runoff Filter Socks Improves Performance

Scientists from the Agricultural Research Service's Animal and Natural Resources Institute in Beltsville MD, and researchers from Filtrexx International, say they improved on the performance of filter socks used to partially remove contaminants from storm water runoff from construction sites and other disturbed earth sites. Adding flocculation agents to the compost inside the socks improved reduction percentages of contaminants by up to one-third, including reducing E. coli and motor oil by 99%. [July 2010. Military Implications, Source⁵⁶]

Counter Bioterrorism or Pandemic Technologies

[Portable Virus Detector Could Check Pandemics](#)

[More Reliable "Kill Switch" Found for Genetically Engineered Microbes](#)

[Potential Bioweapon Countermeasure against Ebola and Marburg Virus](#)

Portable Virus Detector Could Check Pandemics

A team at the A*STAR Institute of Bioengineering and Nanotechnology (IBN) in Singapore, led by Pavel Neuzil, reports developing a portable device for rapid detection of viruses in the environment. The unit implements a real-time polymerase chain reaction capability by using a silicon-based micromachined 'lab-on-a-chip', replacing the conventional light source with a light-emitting diode, and replacing the photomultiplier tube with a photodiode. The developers claim that the system can detect H5N1 viruses in as little as 35 minutes and is some 50 times cheaper than competing devices. This technology, when commercialized, could greatly improve the efficiency of detecting pathogenic organisms in the environment. [November 2010. Military Implications, Sources⁵⁷]

More Reliable "Kill Switch" Found for Genetically Engineered Microbes

Prof. James Collins and colleagues at Boston University claim development of a highly tunable genetic "switch" offering a high degree of control over genetically engineered microbes, lessening worries about "rogue" organisms escaping into the environment. According to a descriptive article, they have devised a "highly tunable genetic [RNA] 'switch' that ... makes it possible to stop the production of a protein and restart it again. The switch, which could be used to control any gene, can also act as a 'dimmer switch' to finely tune how much protein a microbe would produce over time." [August 2010. Military Implications, Source⁵⁸]

Potential Bioweapon Countermeasure against Ebola and Marburg Virus

Scientists of the University of Illinois at Chicago have identified a family of small molecules that apparently inhibit the Ebola and Marburg virus entry into human cells. Although not a cure, the breakthrough could represent a potential bioweapon countermeasure against use of those agents. [January 2011. Military Implications, Source⁵⁹]

Promising Environment-friendly Technologies

[Nanoimprint May Create Synthetic, Chemical-Free, Anti-Bacterial Surfaces](#)

[Optical Link Facilitates Exploration of the Underwater Environment](#)

[Advances in Wireless Location Detection](#)

[Charged Particle Generators Produce Desert "Rainstorms"](#)

[Metal-Organic Frameworks \(MOFs\) Give Greatly Improved CO₂ Storage](#)

[Carbonates for Construction Drawn from Carbon Dioxide](#)

[Improved Plastic Recycling](#)

[New Cement Process Greatly Reduces Energy Load and CO₂ Emission](#)

[Sustainable Method to Recycle Rubble into Durable Construction Material](#)

[New Forms of Air Conditioning Assuming Larger Role](#)

Nanoimprint May Create Synthetic, Chemical-Free, Anti-Bacterial Surfaces

Singapore's A*STAR Industrial Consortium On Nanoimprint and collaborating organizations are working on a project to create synthetic, chemical-free, anti-bacterial surfaces that can protect external structures from harboring pathogenic organisms. The nanoimprint technology creates complex nanometer-sized patterns on surfaces to mimic the texture of natural contaminant-repelling materials. [January 2011. Military Implications, Sources⁶¹]

Optical Link Facilitates Exploration of the Underwater Environment

Engineers at Woods Hole Oceanographic Institution have developed an optical modem system which allows data and command communication with an autonomous undersea research vehicle without the need for tethering with bulky cables. The system demonstrated error-free transmissions at 1 megabit per second at a range of more than 100 meters. [July 2010. Military Implications, Source⁶²]

Advances in Wireless Location Detection

MIT's Laboratory for Information and Decision Systems (LIDS) is developing an exploratory model of wireless "limits" that has relevance for improved, practical, high resolution location communication applications, which can utilize low cost, limited battery life mobile devices. The researchers say this is the first study of its kind and that they have "designed novel location-aware networks with sub-meter accuracy and high reliability" by calculating optimal efficiencies of signal detection within various wireless positioning systems. The group's work will appear as a pair of papers in the IEEE Transactions on Information Theory October issue. [September 2010. Military Implications, Source⁶³]

Charged Particle Generators Produce Desert "Rainstorms"

Scientists from the Swiss company Metro Systems International, working in the United Arab Emirates, have been trying to produce rainfall in the desert. Their system uses electronic ion generators to produce charged dust particles, which rise in the atmosphere and attract moisture that then falls as rain. Their claim of having created at least 52 specific "rain storm events" with this system has been met with some skepticism, although most of the storms were in July and August, when usually there is no rain at all. [January 2011. Military Implications, Source⁶⁴]

Metal-Organic Frameworks (MOFs) Give Greatly Improved CO₂ Storage

Researchers from UCLA and Seoul's Soongsil University report development of several new MOF materials with greatly improved capability for CO₂ capture and storage. [July 2010. Military Implications, Sources⁶⁵]

Carbonates for Construction Drawn from Carbon Dioxide

Utilizing funding from Italian energy company Eni, Prof. Angela Belcher of MIT and two graduate students have developed a bench-scale, biological process to remove CO₂ from the environment and transform it into solid carbonate. The procedure produces approximately two pounds of carbonate for each pound of CO₂, without the use of heating, cooling, or toxic chemicals. The MIT group plans to test scaling the process by applying it to the CO₂ emissions at a fossil-fuel-burning power plant. They also believe the process's mineral ions can be obtained from briny water that is a byproduct of water desalination. [September 2010. Military Implications, Source⁶⁶]

Improved Plastic Recycling

Warwick Ventures at the University of Warwick, Coventry, England, has announced a new technology, using pyrolysis and fluidized beds that they claim will allow the recycling of 100% of household plastics instead of only 11% processed today (as measured in the U.K.). [December 2010. Military Implications, Source⁶⁷]

New Cement Process Greatly Reduces Energy Load and CO₂ Emission

A project led by chemist Peter Stemmermann at Germany's Karlsruhe Institute of Technology reports a new variety of cement called Celitement. It requires less energy to manufacture and

emits less CO₂ in the production process. Cement manufacturing is responsible for about 5% of global CO₂ emissions. [January 2011. Military Implications, Sources⁶⁸]

Sustainable Method to Recycle Rubble into Durable Construction Material

Researchers at Georgia Tech describe a technique to recycle such building debris as that from the Haiti earthquake into a strong concrete material using sands and other natural materials widely available locally. While concerns remain about the variable quality of the concrete rubble and local materials, and the need to conduct further research on recycled concrete in general, lab tests show the new building substance “meets or exceeds the minimum strength standards defined by the American Concrete Institute and used in the U.S.” [January 2011. Military Implications, Sources⁶⁹]

New Forms of Air Conditioning Assuming Larger Role

Restrictions on appliance energy requirements and energy usage are forcing a trend away from the conventional refrigeration-based units and toward other means, such as radiant cooling and evaporative coolers. [Related item: *Only Very Low-Energy Buildings to Be Built in EU after 2020* in May 2010, and *Increasing Energy Efficiency* in July-August 2008 reports.] [August 2010. Military Implications, Source⁷⁰]

Increasing Energy Efficiency Technologies

[New Insights into Photosynthesis Could Change Energy Storage and Transmission](#)

[Adding Graphene to Lithium-Ion Batteries Dramatically Reduces Recharge Time](#)

[Carbon Nanotube Cathodes, Silicon Anodes Improve Battery Performance](#)

[New Solar-Powered Process Converts Atmospheric CO₂ to Solid Carbon](#)

[Solar Energy Conversion System Uses Both Photovoltaic and Thermal Technologies](#)

[New Supercapacitor Design Claims Large Improvements in Energy Storage](#)

[New Window Developments Aim at Saving, Generating Energy](#)

[NSF Makes 14 Grants in Renewable Energy and Sustainability](#)

New Insights into Photosynthesis Could Change Energy Storage and Transmission

Researchers at MIT have observed the maximal efficiencies of chromophores (light-sharing molecules active in photosynthesis) via a laboratory-based construct of artificial self-assembling molecules. The researchers believe they now have a macro-understanding of the photosynthetic process. With this new understanding, scientists in the field believe synthetic chemical systems based on photosynthesis have the potential to store and transmit solar energy with far greater performance ratios than today’s photovoltaic technology. [Related item: *Photoelectric Energy Efficiency Increase by Photosynthesis-type Semiconductor Structure* in March 2009 environmental security report.] [November 2010. Military Implications, Source⁷¹]

Adding Graphene to Lithium-Ion Batteries Dramatically Reduces Recharge Time

DOE’s Pacific Northwest National Laboratory, Vorbeck Materials Corp. of Jessup MD, and Professor Ilhan Aksay of Princeton University collaborated in developing a new technology

incorporating graphene into lithium-ion batteries, thereby reducing their recharge times by factors from 10 to 30. [July 2010. Military Implications, Source⁷²]

Carbon Nanotube Cathodes, Silicon Anodes Improve Battery Performance

Contour Energy Systems, Inc. of Azusa CA has announced its licensing from MIT of a carbon nanotube technology that it says can dramatically improve the power capability of lithium-ion batteries. Prof. Shao-Hom of MIT stated, “These carbon nanotubes contain numerous functional groups on their surfaces that can store a large number of lithium ions per unit mass ... [Thus] for the first time, carbon nanotubes can serve as the cathode in lithium-ion batteries, instead of the traditional role that carbon materials have played as the anode in such systems,” producing faster reactions and delivering high power, approaching 10 times current total power delivery capability. Corvus Energy of Vancouver reports achieving 22% better power storage by using lithium nickel manganese cobalt instead of lithium iron phosphate.

According to Nanowerk News, Prof. Sibani Lisa Biswal, of Rice University and colleagues there and at Lockheed Martin have developed a new anode material for lithium-ion batteries consisting of silicon densely filled with pores 1 micron wide and 10-50 microns long in which lithium can be absorbed and released – as much as 10 times as much as with equivalent carbon material. This structure overcomes the previous deficiency of a silicon base: cracking after a limited number of recharge cycles. [October 2010. Military Implications, Sources⁷³]

New Solar-Powered Process Converts Atmospheric CO₂ to Solid Carbon

Professor Stuart Licht of the Department of Chemistry and Solar Institute at George Washington University and collaborators report the STEP (Solar Thermal Electrochemical Photo) process, which uses solar radiation both to heat a molten lithium carbonate electrolyte that splits the CO₂ into free oxygen and solid carbon that is formed at the cathode, and to provide energy for the electrolysis. [July 2010. Military Implications, Sources⁷⁴]

Solar Energy Conversion System Uses Both Photovoltaic and Thermal Technologies

Prof. Nick Melosh of Stanford University and colleagues have reported a new solar energy conversion technology, "photon enhanced thermionic emission," (PETE) which allows a photovoltaic cell to operate at temperatures over 200°C, enabling the construction of a solar energy conversion system that utilizes both solar light and heat to produce electricity. [August 2010. Military Implications, Source⁷⁵]

New Supercapacitor Design Claims Large Improvements in Energy Storage

Prof. Yury Gogotsi of Drexel Univ., Philadelphia PA, and colleagues have announced the development of a supercapacitor which they describe as having more power per volume comparable to electrolytic capacitors, as well as four orders of magnitude higher capacitance, an order of magnitude higher energy per volume, and three orders of magnitude higher speed. According to the announcement and abstract, the microsupercapacitors are produced by integrating into a microdevice, without the use of organic binders and polymer separators, a component comprising a several-µm-thick layer of onion-like 6–7 nm. carbon spheres, yielding a high surface-to-volume ratio of active material. [August 2010. Military Implications, Sources⁷⁶]

New Window Developments Aim at Saving, Generating Energy

Soladigm, Inc. of Milpitas, CA is working on a line of lower cost electrochromic windows which allow electronic control of the radiation passing through them, keeping out unwanted solar heat in summer and allowing it to pass during winter, thereby reducing air conditioning and heating costs. The windows contain multiple electronic control layers sandwiched between two layers of glass. The company has licensed technology to resolve problems with the idea. Its overall cost-competitiveness with conventional windows, or with low-E windows, that both passively block near-infra-red is uncertain.

EnSol AS, of Bergen, Norway, in cooperation with the Univ. of Leicester, Dept. of Physics and Astronomy, has patented a novel thin film solar cell technology that they claim could be coated as a thin transparent film (on, for example, windows in buildings) to produce power on a large scale. They hope for commercial availability by 2016. [August 2010. Military Implications, Sources⁷⁷]

NSF Makes 14 Grants in Renewable Energy and Sustainability

The National Science Foundation Office of Emerging Frontiers in Research and Innovation announced 14 grants for fiscal year 2010, awarded to 62 investigators at 24 institutions, working over the next four years on storing energy from renewable sources; and engineering sustainable buildings. According to the announcement, the groups “will pursue creative new approaches to making large-scale energy storage efficient and economical. They aim to construct capacitors and regenerative fuel cells with unprecedented capabilities to harness the sun’s thermal energy, to produce chemical fuel on demand, and to trap off-shore wind as compressed air” and “will investigate the critical flows and fluxes of buildings--power, heat, light, water, air and occupants --to create new paradigms for the design, construction, and operation of our homes and workplaces.” [October 2010. Military Implications, Source⁷⁸]

Technologies for New Generations of Cars

Experts Say Possible Rare Earth Shortages Not A Real Problem for Electric Cars

In response to questions about the possible shortage or non-availability of the rare earth elements required for much of current electronics, in particular electric cars, experts on The Millennium Project's global-energy listserv have indicated that the problem, for electric cars at least, is, in a sense, illusory: the automotive industry need only move over to switched reluctance motors (SRM), which do not need rare earth components and work better in cars than the current permanent magnet (PM) ones; the real problem is technological inertia – a lack of demand for what is actually a better solution to propulsion. Further, there is currently no availability problem with import of rare-earth-using PM motors. [August 2010. Military Implications, Source⁸⁰]

Space Technology

NASA's SERVIR Environmental Imaging-Decision Support System Extended from Mesoamerica and Africa to Asia

According to an announcement, NASA and the Agency for International Development have unveiled SERVIR-Himalaya, a Web-based environmental imaging and management system based in Kathmandu, Nepal. NASA's SERVIR system, already in use in Mesoamerica and Africa, combines satellite imagery, data management tools, and interactive visualization capabilities to help scientists and decision-makers address climate change, biodiversity, and environmental threats, such as flooding, forest fires, and storms. [Related item: *Increased Use of Space Technology for Monitoring Environmental Events* in September 2008 environmental security report.] [October 2010. Military Implications, Source⁸¹]

Technologies that Could Trigger New Forms of Arms Race

A number of significant technology-related trends – including the development of laser weapons, electronic warfare and technologies that impede access to space – appear poised to have major global effects that will impact on NATO military planning and operations.

Active Engagement, Modern Defence. Strategic Concept for the Defence and Security of the Members of the North Atlantic Treaty Organisation adopted by Heads of State and Government in Lisbon. 19 Nov. 2010

Robot Planes for Environmental Monitoring and Warfare Raise Legal Concerns

Robot planes are proliferating, as are moral and legal concerns regarding their use. The European Space Agency's Business Incubation Centre at Darmstadt, Germany, and a German start-up company, MAVinci, have developed an unmanned aircraft system guided by satellite navigation (satnav) that uses autonomous micro-air vehicles (MAVs) with a wingspan of less than two meters, to inspect land areas. Boeing's Phantom Works' Vulture II program is developing Solar Eagle, a demonstration solar-powered unmanned aerial vehicle (UAV) that will make its first flight in 2014, and is designed to lead to a large vehicle that can remain on station in the upper atmosphere for up to five years. An analogous effort is the hydrogen-powered demonstrator, Phantom Eye, designed to stay aloft for up to four days and scheduled to make its first flight in 2011. These are only a few of the latest advancements in remote-controlled warfare with promising positive environmental and security results. Nevertheless, recently, a trial in a Las Vegas court against the anti-drone protesters group Creech 14, who allegedly trespassed onto Creech Air Force Base in April 2009, was delayed for four months. This sets the stage for a debate concerning the eventual need for clear regulations regarding the circumstances for using remote-controlled warfare components. [September 2010. Military Implications, Sources⁸³]

B. Preventing or Responding to Environmentally Caused Conflicts

Key environmental and resource constraints, including health risks, climate change, water scarcity and increasing energy needs will further shape the future security environment in areas of concern to NATO and have the potential to significantly affect NATO planning and operations.

Active Engagement, Modern Defence. Strategic Concept for the Defence and Security of the Members of the North Atlantic Treaty Organisation adopted by Heads of State and Government in Lisbon. 19 Nov. 2010

SECURITY IMPLICATIONS OF ENVIRONMENTAL ASPECTS

New Website Addresses Conflict-sensitive Conservation

While most of the discourse is around environmental protection in case of conflict, a new website is addressing conflict-sensitive conservation (CSC) in order to prevent conservation activities from exacerbating conflict or impeding peacebuilding. Since many of the world's biodiversity hotspots are located in socially and/or politically unstable zones, conservation organizations have to "adopt conflict-sensitivity". IISD, one of the project's founding organizations, notes that conservation activities could exacerbate conflict situations by restricting populations' access to key livelihood resources; introducing new or additional economic burdens or risks; and/or causing unequal distribution of benefits. The CSC website offers a portal for understanding the links between conservation and conflict in order to reduce their potential negative backlash, while also suggesting best practices and ideas for improving situations. [July 2010. Military Implication, Sources⁸⁶]

Extinction Threatening 21% of Africa's Freshwater Species Could Have Security Implications

According to the Red List by the International Union for Conservation of Nature (IUCN), 21% of all African freshwater species are currently under threat of extinction due to such factors as pollution, deforestation, and overfishing. The assessment was carried out over five years by 200 scientists who investigated over 5,000 species. Their report indicates that species extinction is directly related to food security in Africa and that a "whole systems" approach is required to ensure that infrastructure and agricultural development projects in Africa include freshwater management for biodiversity. [Related items: *Biosafety Protocol Advances* in February 2010, and *Food and Water Security* in June 2008 environmental security reports.] [September 2010. Military Implications, Source⁸⁷]

Possible Conflicts over National/Regional Geoengineering Projects

A study published in *Nature Geoscience* warns that conflicts are possible between those who do and those who do not implement "cheap" geoengineering projects. The most likely to be tried are solar radiation management projects using aerosols inserted into the stratosphere to increase solar heat reflection, since the effects of such efforts cannot be entirely foreseen even for the areas

directly targeted, let alone neighboring ones. Similar warnings were issued by a Science and Technology Committee earlier this year, and by the Met Office. Additionally, an international team of scientists reports that, unless involving extreme measures, geoengineering approaches would have little efficiency in curbing sea levels rising. The findings, assessing five geoengineering approaches were summarized in the paper *Efficacy of geoengineering to limit 21st century sea-level rise*, published by the NAS. [Related item: *Geoengineering May Require International Environmental Regulations* in January 2010 environmental security reports.] [August 2010. Military Implications, Sources⁸⁸]

Indigenous People Demanding Regulations for Addressing Climate Change and Mining

The Forum of Indigenous Peoples Mining, Climate Change and Well Being, held in Lima, November 18-20, 2010, has issued the Lima Declaration demanding measures to address implications of climate change and mining on indigenous land. The Declaration calls on governments to enact measures limiting (or revoking) transnational companies' rights to mine on indigenous land without consultation with the indigenous people, and the adoption of laws to determine zones prohibited for mining on indigenous territories. It calls upon the UN to declare indigenous peoples "the rightful owners since the ancient times of the soil, subsoil and natural resources" of their territories. They also declare being "committed to instrumentalize the International Court of Justice Climate" and the "construction of a national and regional agenda for climate justice." [Related item: *Indigenous Peoples Demand More Involvement in Environmental Policies* in May 2008 environmental security report.] [December 2010. Military Implications, Sources⁸⁹]

RACE FOR NATURAL RESOURCES

Natural Resources Fuel Violence in Eastern D.R. Congo

Approximately 500 citizens in eastern Democratic Republic of the Congo were attacked by militias allegedly including Rwandan and Congolese rebel forces. The attacks occurred in several areas of the Kivu provinces at the epicenter of mineral mining activities and in proximity to forests and forest preserves where illegal timber logging and rare mineral extraction have historically fueled conflict. UN aid workers estimate that 890,000 people are internally displaced in the provinces, while UN Assistant Secretary-General for Peacekeeping Atul Khare indicated that current security forces in the region have been unable to maintain their peacekeeping mandate, which includes the protection of civilians and, by extension, control of natural resources through training and other military assistance to the government. Meanwhile, reports from international agencies, including the World Bank, have concluded that weak legal, financial, and policy frameworks in D. R. Congo discourage formulation of national development goals that can be aligned with judicious natural resource use. The weakness also inhibits implementation of effective control mechanisms for natural resource stewardship, including an inability to monitor, evaluate, and secure the use of land for productive agricultural purposes. [Related item: *The Race for Natural Resources a Potential Impediment for Peace* in June 2010 environmental security report.] [September 2010. Military Implications, Sources⁹¹]

Protests in Peru over Dam Irrigation and Hydroelectric Project Part of a Regional Picture

A major Peruvian irrigation and electricity project that includes diversion of water from the Apurímac River is protested by local citizens who claim they were not consulted during the tender process and that the project will destabilize their water source. A Spanish-Peruvian consortium received a concession to dam and divert water for irrigation and electricity capacity to encompass approximately 66,000 hectares (163,000 acres) of new land and to generate more than 500 Mw of power. The Majes-Sigüas Special Project does not appear to require contractual provisions for the benefit of local populations. An environment ministry official said that there are around 1,000 ongoing conflicts over water in this one region, of which more than 40 are potentially serious. [Related items: *International Lawsuits for Environmental Crime Proliferate* in January 2010, and *Indigenous Peoples Demand More Involvement in Environmental Policies* in May 2008 environmental security reports.] [September 2010. Military Implications, Sources⁹²]

The Battle for Rare Earth Elements Continues

A Japanese government-backed enterprise plans to deploy remote-controlled robots to mine rare earth elements up to a depth of 6,600 ft. from the seabed in proximity to the Izu and Ogasawara island chain and southwestern Okinawa islands. The project is targeting seabed volcanoes in search of minerals released from hydrothermal vents. Precious metals and methane hydrate, a potential next-generation fuel, are also a potential area of focus. [Related item: *Chinese Rare Earth Restrictions* in September 2010 environmental security report.] [January 2011. Military Implications, Sources⁹³]

Chinese Rare Earth Restrictions

China announced it is reducing its annual rare earth exports by 40%. This limits shipments to a little over 30,000 tonnes, which is 15,000-20,000 tonnes less than consumption by non-Chinese producers. Prices of the minerals have skyrocketed over the past year, and countries are searching for replacement sources; possibilities include the U.S., Australia, Vietnam, Kazakhstan, Afghanistan, and Tanzania. The export curtailment follows a period of low Chinese prices that caused many countries' mines to be dismantled and closed completely. The rate of discovery or reactivation for sources may be enough to prevent shortages; however, some of these countries have problems of stability, finances, qualified work force, and environmental policies, since the extraction of these elements involves the use of highly toxic chemicals. [September 2010. Military Implications, Sources⁹⁴]

China Applies for Seabed Mining Permit in Search for New Mineral Resources

China has filed the first application with the International Seabed Authority for deep seabed mining in international waters to search for valuable metals such as copper, nickel, cobalt, gold and silver. This application for mining of sulfides in the southwest Indian Ocean at depths of more than 5,000 feet below the surface is expected to be heard April 2011. If successful, many more applications are expected to follow from China and other countries. Environmental experts are already expressing concerns about the potentially major consequences that deep-sea mining could have on the marine ecosystem. [Related item: *The Race for Natural Resources a Potential Impediment for Peace* in June 2010 environmental security report.] [New estimates show large resources may be possible in Afghanistan.]

Apart from these relatively common metals, the world could experience shortages of rare earth minerals needed for renewable energy and information technologies as soon as 2012. China produced more than 97% of the world's rare earth oxides in 2009, and controls about 50% of the globe's known reserves. Recently it announced a 72% cut in its exports of rare earths for the second half of 2010. In order to decreasing its dependence on foreign minerals, the U.S. is considering reviving the domestic rare earths mining industry, most probably beginning with the Mountain Pass CA mine that plans to increase mining and processing to 20,000 tons of rare earths by 2012, from the current 2,000 tons a year. [July 2010. Military Implications, Sources⁹⁵]

China to Build Support Base for Seabed Exploration

China has announced that it will build a \$73 million support base at Qingdao, on the Shandong Peninsula, between Beijing and Shanghai, for its deep-diving submersible research vessel "Jiaolong", designed to dive as deep as 7,000 meters. This emphasizes the increasing role that the seabed will play in the worldwide rivalry for new resources. [August 2010. Military Implications, Source⁹⁶]

Arctic and South China Sea Resource Issues Causing U.S. to Review Law of the Sea

A Joint Statement of the 2nd US-ASEAN Leaders Meeting reaffirmed regional peace in accordance with principles of international law including the UN Convention on the Law of the Sea, which is a main legal tool for protection against China's claims in the South China Sea. "Disagreements over territorial claims and the appropriate use of the maritime domain appear to be a growing challenge to regional stability and prosperity," stated Secretary of Defense Robert Gates at a multilateral event in Hanoi, Vietnam, with reference specifically to the South China Sea. Secretary of State Hillary Clinton also underlined that the U.S. will "prioritize the Law of the Seas next year. It is critical to how we're going to manage the Arctic. It is critical to our credibility in working with nations in Southeast Asia over questions regarding activities in the South China Sea." The Convention has 161 parties (including the European Union), and out of the 35 nonparties, 17 are land-locked states. [Related item: *Resources Trigger Overlapping Claims for Maritime Areas* in May 2009 environmental security reports.] [October 2010. Military Implications, Sources⁹⁷]

Arctic Debate

"The Arctic: Territory of Dialogue" forum was hosted by the Russian Geographical Society on September 22-23, 2010, attended by foreign and Russian scientists, political figures, NGOs, and business representatives. The main purpose of the forum was to discuss potential international cooperation in the Arctic. The Russia-Norway treaty was cited as an example several times. While highlighting that in 50 years the Arctic may become a major source of energy and a key transportation route, Vladimir Putin noted that priorities should be creating comfortable life conditions for the people living in the region, and respect for the fragile ecosystem by "the most stringent environmental requirements," as well as development of research and environmental infrastructures. Well-known polar explorer and state Duma deputy Artur Chilingarov suggested that the forum should become a regular event, and a Polar Decade launched. Experts also noted the need to create a single global database on the Arctic, while Russian Emergencies Ministry Sergey Shoygu (who is also president of the Russian Geographic Society) said that an atlas of the

Arctic would be prepared soon. Along the same lines, the statement produced by the 9th Conference of Parliamentarians of the Arctic Region, hosted by the European Parliament in Brussels, September 13-15, 2010, highlights the need for continuous improvement of the assessment of the social and economic consequences of natural resource exploration and exploitation, consequences of climate change for Arctic populations and wildlife habitats, cooperation in education and research, and the tighter economic and geopolitical links. September 2010. [Military Implications, Sources](#)^{99]}

Literature Addressing Arctic Security

Protecting the Arctic Biodiversity: Limitations and Strengths of Environmental Agreements, a report by UNEP, assesses the status and adequacy of current multilateral environmental agreements that deal with protecting the Arctic from the effects of climate change. It underlines that changes in Arctic biodiversity also impact neighboring countries and regions, given the migratory nature of many of the Arctic species, and that global effort is needed to address climate change causes and effects. Challenges include the generally outdated nature of the MEAs—based on past understandings of the Arctic environment—as well as insufficient implementation, which makes it difficult to assess progress and adequacy. Recommendations include: an audit of the MEAs on the Arctic to assess their effectiveness, relevance, and options for improvement, as new actors become involved in the Arctic and its resources; and an increased role of the Arctic Council to ensure sustainable use of the Arctic.

The Arctic Sea Competition and Key Strategic Challenges for Europe. an article published in *Second Line of Defense* summarizes the present state of affairs in the Arctic, highlighting its economic and strategic importance.

The Canadian Arctic: Threat from Terrorists and Extremists. a newly declassified intelligence assessment, prepared by the Integrated Threat Assessment Centre, claims that in recent years, vessels with links to human smuggling, drug trafficking, and organized crime have attempted to access the Canadian Arctic. It also notes that over the past 10 years, the population of the Canadian Arctic increased by 16%. Visitors to the area have also increased, including cruise ships, tourists, and peace activists, leading federal agencies to increase monitoring of incoming people, goods, and threats from the North.

The *Security in Canada's North: Looking Beyond Arctic Sovereignty* report by the Conference Board of Canada suggests “community security” should be considered instead of only military sovereignty. [November 2010. [Military Implications, Sources](#)^{100]}

NATURAL DISASTERS AND SCIENTIFIC EVIDENCE

Scientific Evidence and Potential Consequences of Climate Change

(Listed by month in reverse chronological order)

2010 was one of the two warmest years on record (tied with 2005), and the 34th consecutive year above the 20th century average, announced the World Meteorological Organization (WMO) based on data from the UK Meteorological Office Hadley Center, NOAA, and NASA. Exceptionally warmer regions included much of Africa and southern and western Asia, Greenland, and Arctic Canada, with some sub-regions registering temperatures 1.2 to 1.4°C (2.2

to 2.5°F) above the long-term average. The WMO also notes that 2001-2010 was the warmest decade on record, with the global average 0.46°C above the 1961-1990 average. WMO also underlines the high number of extreme weather events in 2010, including severe floods in Pakistan, Sri Lanka, the Philippines, Brazil and Australia, as well as the heat wave in Russia.

2010 was also one of the deadliest years of the last two decades, according to the Centre for Research on the Epidemiology of Disasters. There were 373 disasters registered, which killed 296,800 people, affected 207 million, and caused damages estimated to \$109 billion. Some 89% of all those affected by disasters in 2010 lived in Asia. Similarly, according to Munich Re, 2010 natural catastrophes killed 295,000 people, costing approximately \$130 billion. By its standards, there were 950 natural disasters in 2010 (365 in the Americas, 310 in Asia, 120 in Europe, 90 in Africa and 65 in Australia and Oceania); 90% were weather-related. The other major reinsurer, Swiss Re, reported that man-made and natural disasters in 2010 caused worldwide economic losses of \$222 billion, more than three times more than in 2009.

Mapping the impacts of natural hazards and technological accidents in Europe, a report by the European Environment Agency, found that the number and impacts of disasters in Europe have increased over the period 1998-2009, causing nearly 100,000 fatalities and economic losses of about €150 billion (approx. \$200 billion). It warns that losses due to climate change are likely to increase in the future. [January 2011. [Military Implications, Sources](#)¹⁰³]

Since 1970, each decade has been warmer than the preceding one, and 2000-2010 has been the warmest one on record, conclude preeminent meteorological organizations, despite some uncertainties and differences of measurement methodologies. Based on preliminary data from NASA and NOAA, 2010 might be the warmest year on record.

The *Climate Vulnerability Monitor 2010* estimates that the number of countries with most acute vulnerability will increase from 17 in 2010 to 48 in 2030. Using color-coded graphics, the report shows the worldwide vulnerability to climate change, comparing today's situation with forecasts to 2030 as to health impacts, weather disasters, habitat loss, and economic stress. For example, annual deaths due to changing climate conditions could rise from 350,000 now, to 1 million by 2030, unless adaptation policies are implemented in vulnerable countries. Floods will cause most of the deaths from extreme weather.

Climate Risk Index 2011 by Germanwatch shows that in the period 1990-2009, developing countries are among the ten most affected by extreme weather and noted the importance of comprehensive risk management which includes new regional and international insurance approaches in accordance with the 'polluter pays' principle. [December 2010. [Military Implications, Sources](#)¹⁰⁴]

Unusually heavy rains since mid-September have caused Benin's worst floods in half a century. The UN Office for the Coordination of Humanitarian Affairs reported that floods affected over 680,000 people in two-thirds of the country, and severely damaged schools, hospitals, and infrastructure, and that there were about 850 reported cases of cholera. Since rains were predicted to continue through November, the total devastation is likely to increase. *Natural Hazards, UnNatural Disasters: The Economics of Effective Prevention*, a joint report by the World Bank and the UN, estimates that by the end of this century, annual global losses from natural disasters could triple to \$185 billion, without calculating the impact of climate change, which could add \$28-68 billion per year from tropical cyclone damages alone. By 2050, the number of people exposed to storms and earthquakes in large cities could double, to 1.5 billion.

The report outlines a number of measures to prevent death and destruction from natural hazards, calling for increased spending for early warning systems, particularly weather forecasting. [November 2010. [Military Implications, Sources](#)¹⁰⁵]

2010 will be the warmest for Nuuk, the capital of Greenland, in 138 years. Four glaciers lost more than 10 square miles (25.90 sq km) each. Since glacier ice losses seem to be accelerating, sea level rise projections might also need to be revised. [October 2010. [Military Implications, Sources](#)¹⁰⁶]

A report by the Russian Federal Service for Hydrometeorology and Environmental Monitoring revealed that over the past century, the country's average temperature rose almost twice as fast as the global average and nearly three times faster in parts of Siberia during the winter.

The U.S. National Oceanic and Atmospheric Administration notes that the Atlantic Ocean was considerably warmer this year, with temperatures in some parts being 3°F above the average by the end of August. The National Hurricane Center identified 15 tropical cyclones by the end of September, including seven hurricanes compared with two in an average season when waters are cooler. The Center predicts that by the end of the 2010 Atlantic hurricane season, there will be about 20 storms with at least 39 mph winds, compared with 11 in a typical year. These storms are serious threats to offshore oil facilities, as well as coastal communities. According to the New York-based Insurance Information Institute, eight of the ten most expensive U.S. catastrophes were caused by hurricanes. [September 2010. [Military Implications, Sources](#)¹⁰⁷]

The *2009 State of the Climate* report released by the U.S. National Oceanic and Atmospheric Administration concludes that there is no doubt that the world is warming. The past decade was the hottest on record, each of the last three decades was warmer than the one before, and the average temperature increased a little over 0.5°C (0.9°F) over the past 50 years. The report is based on compilation of 10 indicators, including historical data on temperatures, humidity, sea levels, sea ice, glaciers and spring snow cover going back to 1940 or 1850, depending on the type of data. The results show increases in: temperature of air over land and oceans, and of sea surface; sea level; ocean heat; humidity; and temperature in the troposphere. At the same time, there were decreases in: Arctic sea ice; glaciers; and spring snow cover in the northern hemisphere. The report is the result of collaboration among about 300 scientists from 160 research groups in 48 countries. It makes no comments about the potential causes of warming.

The World Meteorological Organization has published information on the unprecedented sequence of recent extreme weather events. A longer time range is required to determine whether an individual event is attributable to climate change, but the sequence of current events matches IPCC's projections of more frequent and more intense extreme weather events due to global warming, says the WMO. While the northern hemisphere had to deal with extreme heat waves, the southern hemisphere witnessed intense cold and record snows. There are fears that the abnormal weather triggers social and environmental problems around the world. [August 2010. [Military Implications, Sources](#)¹⁰⁸]

Mass bleaching of coral reefs has been reported throughout Southeast Asia, the Indian Ocean, and the Pacific. The damage so far has been the worst since 1997/1998 when high ocean temperatures killed an estimated 16% of the world's reefs, but with ocean temperatures reaching record levels and combined with the end of an El Niño episode, scientists warn that even more

damage could come. While reefs can often recover from bleaching, it could take corals between 10 and 70 years to recover from bleaching events of such magnitude. Also, a recent study showed that rising temperatures slow the speed of coral growth. In the Red Sea, coral growth declined by a third over the past 12 years, and scientists warned that coral there would cease growing entirely by 2070 if warming continues.

Meantime, worldwide phytoplankton levels decreased 40% since the 1950s, reveal Canadian and U.S. scientists in a study published in the journal *Nature*. They say that the likely cause is global warming, which increases difficulty for plant plankton to get vital nutrients. The most dramatic changes are noted in the Arctic, southern, and equatorial Atlantic and equatorial Pacific oceans, while the Indian Ocean is not showing a decline. [July 2010. [Military Implications, Sources](#)¹⁰⁹]

MIGRATION TRIGGERED BY ENVIRONMENTAL CAUSES

Climate Refugees Trends

Following November's Brasilia Declaration, Mexico has recently passed a unique Law on Refugees and Complementary Protection, becoming the first country in the region to grant "complementary protection" for those not considered refugees but at risk of other threats.

Within Africa's Sahel, a region of approximately 60 million inhabitants, extreme drought and unpredictable weather patterns continue to worsen food and water security, and interregional migration. Additionally, insecurity triggered by spending money from natural resources (such as the oil money in Chad) on soldiers and military weaponry, exacerbates human migration.

The IOM reports that, worldwide, there are an estimated 740 million internal migrants and 214 million international migrants, with approximately 60% of all migration occurring within countries in the same category of development. [December 2010. [Military Implications, Sources](#)¹¹²]

The Tarawa Climate Change Conference held November 9-11, 2010 in Tarawa, Kiribati, as a session of the Climate Vulnerable Forum, concluded with the release of the Ambo Declaration. Participants called for a number of actions, including design of strategies for protecting people displaced within or across borders due to climate change, and establishing a mechanism for climate change disaster risk. The Declaration was adopted by: Australia, Brazil, Canada, China, Cuba, Fiji, Japan, Kiribati, Maldives, Marshall Islands, New Zealand, Solomon Islands, and Tonga. [November 2010. [Military Implications, Sources](#)¹¹³]

The website for the Climate Change Displaced Persons Convention Project has added a frequently asked questions (FAQ) section. It gives a comprehensive overview of issues related to climate change-caused displacement.

At the request of Marshall Islands leaders, Michael Gerrard, who leads Columbia Law School's Center for Climate Change Law, issued a call for papers and is organizing a conference on the questions related to national sovereignty of countries (or parts of countries) that might disappear due to rising sea levels; e.g., citizenship of their people, control of offshore rights, etc.

An estimated 18 million people were displaced by the floods in Pakistan—in what is considered the worst natural disaster to date attributable to climate change. In the southern Sindh province, as the Indus River was running at 40 times its normal volume of water, almost one million people were displaced in addition to some 17 million people already displaced by

monsoon floods. An estimated 1.2 million homes were destroyed and 3.2 million hectares (7.9m acres) of farmland representing about 14% of Pakistan's cultivated land were damaged, triggering famine and water concerns. [August 2010. [Military Implications, Sources](#)¹¹⁴]

Advocating for Safe Movement as a Climate Change Adaptation Strategy for Pastoralists in the Horn and East Africa, a new report by the Security Mobility Initiative, finds increasing levels of migration and conflict over often scarce resources. According to the report, vulnerability, a lack of preparedness, and appropriate, timely and relevant responses to natural disasters left millions in need of humanitarian assistance. The report recommends urgent actions to help pastoralists cope with the growing impacts of climate change, for example, to facilitate safe passage across borders in the Horn and East Africa region. In June, the European Commission adopted a €20 million humanitarian financial package to support 12 million people affected by drought in the Greater Horn of Africa in developing resilience to drought and adapting to climate change.

The International Food Policy Research Institute (IFPRI) assesses the extent to which Northern Nigerian households migrate in response to weather-related variability and shocks. Its discussion paper, *Migratory responses to agricultural risk in Northern Nigeria*, finds that households use migration as a risk management strategy. The author underscores the importance of understanding how climate affects migration decisions in order to better target resources to cope with climate change. [July 2010. [Military Implications, Sources](#)¹¹⁵]

Renewed Protection for Refugees in Latin America

The “Brasilia Declaration on the protection of refugees and stateless persons in the Americas” was adopted by the delegates of 18 Latin American countries meeting in Brasilia, Brazil, November 11, 2010. In addition to renewed pledges stipulated in previous treaties, the Declaration calls for improved mechanisms for the protection of refugees, migrants, internally displaced, and stateless persons in Latin America by addressing new displacement situations. It reiterates the, “...unrestricted respect for the principle of non-refoulement (non-forced return), including non-rejection at the border and indirect non-refoulement, as well as for the nonpenalization of illegal entry, and non-discrimination, as the fundamental principles of international refugee law”. Since climate change-related factors are expected to increase the number of displaced people around the world, new approaches for potentially larger numbers of such displaced persons seem necessary. The UN High Commissioner for Refugees considers the Declaration, “...a valuable international precedent”, which could help, “...accelerate global efforts to improve the situation of displaced people and end the scourge of statelessness,” and encourages other world regions to follow the example. [November 2010. [Military Implications, Sources](#)¹¹⁶]

MELTING SEA ICE AND GLACIERS

Regional Evidence and Trends

The WMO reports that Arctic sea-ice cover in December 2010 was the lowest on record, with an average monthly extent of 12 million square kilometers, 1.35 million square kilometers

below the 1979-2000 average for December. Greenland also experienced record surface melting and runoff in 2010, with the annual melting season up to 50 days longer than the average observed between 1979 and 2009, and with summer snowfall below average, notes an international group of researchers in a study published in the journal *Environmental Research Letters*, on January 21, 2011. [January 2011. [Military Implications, Sources](#)¹¹⁸]

Recent research shows that the waters off the Western Antarctic Peninsula are warming exponentially, accelerating the melting ice shelf. [December 2010. [Military Implications, Sources](#)¹¹⁹]

A new ice island broke from the Petermann Glacier, one of the two largest remaining glaciers in Greenland. Satellite imagery reveals that the Petermann Glacier lost about 25% of its 43-mile long floating ice-shelf. The new ice island has an area of at least 100 square miles and is 600 feet thick. As it floats towards the Atlantic, there are concerns that it might threaten Canada's offshore platforms and shipping in the area.

Permafrost temperatures during the International Polar Year (2007-09) were 2°C (3.6°F) warmer than they were 20 or 30 years ago, found scientists based on data collected from 575 boreholes located throughout North America, Russia and the Nordic region. They also noted that the rate of thawing of cold permafrost is higher than that of warmer permafrost. [August 2010. [Military Implications, Sources](#)¹²⁰]

FOOD AND FRESHWATER

Food Security Issues

The sixth edition of the Global Risk report by the World Economic Forum identifies the "water-food-energy" nexus as one of three key clusters of risks (the other two being macroeconomic imbalances and illegal economy). The UN Food and Agriculture Organization (FAO) announced that food prices hit a record high in December 2010. Its Food Price Index was 214.7, the highest since 1990 when it was created. In its report *Guide for Policy and Programmatic Action at Country Level to Address High Food Price*, FAO urges countries to refrain from export bans and other actions that could exacerbate the current food crisis. Speaking at the World Economic Forum in Davos, Susilo Bambang Yudhoyono, President of Indonesia, warned that the next economic war could be over scarce resources, if problems of rising food prices, poverty and population growth are not addressed and urged that food security must be a G20 priority. [January 2011. [Military Implications, Sources](#)¹²³]

The Food Security Risk Index 2010 reveals that the countries most at risk from shocks to food supplies are also among the countries with serious security problems. Rated at most "extreme risk" are: Afghanistan, Democratic Republic of the Congo, Burundi, Eritrea, Sudan, Ethiopia, Angola, Liberia, Chad, and Zimbabwe. The Index, assessing basic food staple risks for 163 countries using 12 criteria, is compiled by Maplecroft and developed in collaboration with the World Food Programme. [August 2010. [Military Implications, Sources](#)¹²⁴]

The World Bank's new initiative "Roadmap for Action: Agriculture, Food Security and Climate Change" stresses the role agriculture can play in climate and finance, such as: enhanced resilience and carbon sequestration.

The World Bank notes considerable increase in acquisition of farmlands since 2008. Over the first 11 months of 2009, there were signed deals covering at least 110 million acres, compared to an average 10 million acres per year before 2008.

Food security, farming, and climate change to 2050 by the International Food Policy Research Institute (IFPRI) has 15 scenarios that examine potential population and income growth. While warning that climate change could push staple food prices up 130%, it suggests that improved agricultural productivity, broad economic growth, and robust international trade could mitigate the adverse impacts of climate change on food security. [December 2010. [Military Implications, Sources](#)¹²⁵]

FAO's *Food Outlook* report notes that global grain production will drop by 2% (63 million metric tons) this year, putting the world "dangerously close" to a new food crisis. The bills for food import for the poorest countries are predicted to rise 11% in 2010 and by 20% for the low-income food-deficit countries.

The Global Conference on Agriculture, Food Security and Climate Change took place October 31-November 5, 2010, at the World Forum in The Hague, around the theme 'It's Down 2 Earth.' The Conference initiated a roadmap for action which links agriculture-related investments, food security, and climate change. The roadmap focuses on climate-smart agriculture and includes sections on: policies and strategies; tools and technologies; financing for transformational change; forging partnerships; and the way forward. The Conference was a follow-up to the Shared Vision Statement agreed to at the 17th Session of the Commission on Sustainable Development (CSD 17) in May 2009; the next follow-up conference will be hosted by Vietnam in 2012. [November 2010. [Military Implications, Sources](#)¹²⁶]

The WFP and the FAO released the 2010 edition of *The State of Food Insecurity in the World: Addressing food insecurity in protracted crises*. According to the report, the number of undernourished people has declined but remains unacceptably high (925 million), with 22 countries being in protracted food crises.

According to the World Bank, up to 30 million hectares (74 million acres) of farmland are lost each year due to severe degradation, conversion to industrial use, and urbanization. Additionally, more than a third of large-scale land acquisitions—which in 2009 reached some 45 million hectares—are intended to produce agrofuels rather than food, increasing poverty. The problem is more severe in Africa, where 90% of land is not documented with land rights and ownership. [October 2010. [Military Implications, Sources](#)¹²⁷]

According to the latest estimate, the number of hungry people worldwide decreased in 2010 to 925 million, from 1.023 billion in 2009, but is still unacceptably high, says the FAO and the World Food Programme.

At the emergency meeting convened on September 24th in response to the wheat export ban in Russia and food riots in Mozambique which killed 13 people, experts from FAO Member States agreed that there was no indication of an impending world food crisis. Nevertheless, recognizing that unexpected price hikes "are a major threat to food security" it was agreed that new measures to limit food price volatility and manage associated risks should be explored.

Among the root causes of volatility, the meeting identified “Growing linkage with outside markets, in particular the impact of ‘financialization’ on futures markets”. The paper “Food Commodities Speculation and Food Price Crises” by Olivier De Schutter, UN’s special rapporteur on food, warns that the increases in price and the volatility of food commodities can be explained only by the emergence of a “speculative bubble.” In the meantime, ActionAid cautions that hunger could cost poor nations \$450 billion a year – more than 10 times the amount needed to meet the Millennium Development Goal on halving hunger by 2015. At the “Securing Future Food” meeting convened by the UK Food Group, De Schutter said that the only long-term way to resolve the crisis would be to shift to “agro-ecological” ways of growing food that do not depend on fossil fuels, pesticides, or heavy machinery.

According to the World Bank report *Rising Global Interest in Farmland: Can It Yield Sustainable and Equitable Benefits?* investment overseas in agricultural land has increased tenfold since the 2008 food price rise. While large-scale farmland deals have the potential to deliver benefits to developing countries, the report warns against practices that harm the rights and opportunities for development of local people. Noting that the trend of overseas investment in agricultural land is likely to continue to grow, the report outlines seven principles for responsible agro-investment, including transparency, food security, and social and environmental sustainability. [September 2010. [Military Implications, Sources](#)¹²⁸]

A study by the FAO and the International Rice Research Institute (IRRI) finds that rising temperatures during the past 25 years have already cut the yield growth rate of rice by 10-20% in several locations in Asia, which currently produces more than 90% of the world’s rice.

China’s soil erosion has reached nearly 17% of its total land cover. If current trends continue, 40% of food production will be lost in the next 50 years, according to a study led by the Ministry of Water Resources, and science and engineering academies.

Grain prices have soared in August as Russia, the world’s third wheat producer in 2009/10, banned grain exports until the end of the year as the fires and worst drought on record ravaged crops. Grain exports from Ukraine, the world’s sixth largest wheat exporter, are also facing delays after the introduction of a new system of customs controls. Russia said it would also ask Belarus and Kazakhstan (also major grain exporters and co-members of a regional customs union), to enact a similar ban.

The International Center for Agricultural Research in the Dry Areas (ICARDA) released a book of abstracts from the Food Security and Climate Change in Dry Areas meeting held in February 2010, in Amman, Jordan. The abstracts are organized into themes on: scenarios for climate change in dry areas; impacts on natural resource availability, agricultural production systems and environmental degradation; impacts on food security, livelihoods and poverty; mitigation, adaptation and ecosystem resilience; and enabling environments to cope with impacts. [August 2010. [Military Implications, Sources](#)¹²⁹]

Professor Dana Cordell of the University of Technology in Sydney estimates that world phosphate demand is over 150 million tons per year, that demand will exceed production by 2033, and states, “There is nothing on the market that can replace phosphate on the scale that we need it.” Phosphate is critical for life support and essential for agriculture. U.S. reserves might be exhausted by 2050. Since the lower concentration phosphate deposits are laced with radioactive elements like uranium and thorium, or heavy metals like cadmium, environmental concerns might complicate their exploitation. Addressing phosphorus supply and its environmentally

sustainable exploitation and use should be part of strategies addressing food and environmental security. [November 2010. Military Implications, Sources¹³⁰]

Freshwater Security Issues

(Listed by month in reverse chronological order)

The Abu Dhabi Water Declaration adopted by the 31st Gulf Cooperation Council Summit stresses the connection between water security and diversification of energy and food security as important priorities. The GCC states are expected to create legislation to increase water efficiency, including the pricing system, review of the agricultural sector, and the efficiency of water desalination plants.

The *Managing Blue Gold: New Perspectives to Water Security in the Levantine Middle East* study by the Finnish Institute of International Affairs depicts future challenges of water security in this part of the Middle East and focuses on the ability of governments to secure a sustainable water supply for their populations. [December 2010. [Military Implications, Sources](#)¹³²]

The new *Africa Water Atlas* released by UNEP shows how the challenges of water scarcity in Africa are compounded by high population growth, socioeconomic and climate change impacts, and, in some cases, policy choices. UNEP warns that the findings indicate a decline in the availability of water per person in Africa, and that only 26 of the continent's 53 countries are on track to reach the UN Millennium Development Goals on water. It also features new solutions and success stories across the continent. [November 2010. [Military Implications, Sources](#)¹³³]

According to the Asian Development Bank, Asia could face a 40% gap between water supply and demand in 2030. In order to meet its goals of providing drinking water and sanitation, it would need around \$8 billion a year, most of it having to come from the private sector. [October 2010. [Military Implications, Sources](#)¹³⁴]

The International Water Management Institute (IWMI) released a paper that describes the need for systematic planning in water storage and management to cope with increased rainfall variability. Although water storage increases water security, agricultural productivity, and adaptive capacity, the paper warns that poorly planned storage is a waste of financial resources and may aggravate climate change impacts. It calls for systems that combine complementary storage options and urges consideration of uncertainty in planning. [September 2010. [Military Implications, Sources](#)¹³⁵]

Water Issues between Nepal, India & Bangladesh, a paper by the Institute of Peace and Conflict Studies, notes that the largely agrarian characteristics of the countries in the region and their volatile relations make the region highly prone to water related crises. The paper concludes that water issues are essentially a product of the political relations in the region and points to the benefits of developing joint water management schemes, such as information sharing mechanisms, disaster preparation, and maintenance of a specific quality of water, which, in addition to resolving water issues, would also enhance regional stability. Meantime, tensions between India and Pakistan are growing, with Pakistan filing a case with the international arbitration court to stop the construction of a hydroelectric dam in India in May.

The UN calls upon the international community to help the more than 10 million hungry people across Africa's drought-stricken Sahel region. The hardest hit is Niger, where more than 7 million people — almost 50% of the population — is suffering from lack of food. [July 2010. [Military Implications, Sources](#)¹³⁶]

HEALTH

Potential Impacts of Climate Change

An *Animal Migration and Infectious Disease Risk* study published in *Science* magazine, warns about potential change of patterns of infectious diseases and their transmission from animals to humans due to climate change and environmental degradation, changes of migration patterns, and greater interaction between human and animal habitat. [January 2011. [Military Implications, Sources](#)¹³⁹]

The WHO has published the report of the consultation on *Essential Public Health Package to Enhance Climate Resilience in Least Developed Countries*. The consultation was held in September 2010, in Geneva, Switzerland, with representatives from vulnerable countries, the UNFCCC Secretariat, and relevant WHO departments. There was broad agreement on enhancing resilience through linking environment and health surveillance, vector control, and disaster risk reduction. [November 2010. [Military Implications, Sources](#)¹⁴⁰]

The WHO, together with the Pan-American Health Organization (PAHO) and the Government of Costa Rica, organized a meeting in July 2010 to share experiences in evaluating health risks. Representatives from 16 countries discussed draft guidance for health vulnerability and adaptation assessment that was produced by PAHO, and shared their experience in carrying out national assessments. A new version of the guidance incorporating national inputs will be published later this year. [August 2010. [Military Implications, Sources](#)¹⁴¹]

UNEP Study on Inter-Linkages of Climate Change, POPs, and Human Health

The UNEP study *Climate Change and POPs Inter-Linkages* is the first systematic review of the link between climate change and the release of persistent organic pollutants (POPs), and the impact on human health and the environment. The study reveals that melting glaciers and ice sheets are releasing POPs trapped years ago, while severe and more frequent flooding triggered by climate change could lead to the secondary emissions of POPs through inundation of agricultural lands and POP storage sites. The study underlines the major impact on human health due to bio-magnification through the food chain. The full study will be presented to the 5th meeting of the Conference of the Parties to the Stockholm Convention, to be held in Geneva, Switzerland, in April 2011. [Related items: *New Chemicals Considered for Toxic Lists* in January 2009 environmental security report.] [December 2010. [Military Implications, Sources](#)¹⁴²]

ENERGY SECURITY

Scientists Create 20-Year Roadmap for Nuclear Energy

Scientists at University of Cambridge and Imperial College London have outlined a global plan for nuclear energy to the year 2030. The first stage would replace or extend the life of existing reactors while the second would deploy portable, more efficient reactors with replaceable parts. These scientists claim that flexible “out of the box” modular reactors and those that can be moored offshore would require less maintenance and minimal infrastructural support, have 70-year operational lives, and provide better opportunity for safe radioactive waste recycling. [August 2010. Military Implications, Sources¹⁴⁴]

World Energy Outlook 2010

The *World Energy Outlook 2010* is looking at alternatives for switching to a reliable and environmentally sustainable energy system and post-Copenhagen solutions to limit the global temperature increase to 2°C and how these actions would impact oil markets and renewable energy. It presents updated projections to 2035 of energy demand, production, trade and investment by fuels and regions, and, for the first time, it includes the results from a new scenario based on governments’ pledges to tackle climate change and growing energy insecurity. [September 2010. Military Implications, Source¹⁴⁵]

China is Now the Largest Energy Consumer in the World

The International Energy Agency has announced that China’s energy consumption is now the highest in the world; its energy consumption has doubled since 2000. IEA notes that China’s per capita consumption is one-third of the OECD countries’ average, and credits China’s government for its efforts in reducing energy intensity and becoming a global leader in renewable energy technologies. Meantime, the Netherlands Environmental Assessment Agency report No growth in total global CO₂ emissions in 2009 notes that OECD countries reduced their greenhouse gas emission by 7% during 2009. This reduction has been offset by increases from China and India. CO₂ emissions per capita in China increased from 2.2 tons in 1990, to 6.1 tons in 2009, while, in the same time period, the 15 EU nations decreased from 9.1 tons to 7.9 tons and the U.S. decreased from 19.5 tons to 17.2 tons. Considering the rising Chinese public discontent over pollution and an estimated \$25 trillion cost to clean up environmental damage associated with the country’s rapid industrialization, China’s government is increasingly concerned by the interdependence between economic and security issues. Therefore, in its 2011-2015 state plan, 39% of the performance indicators for government officials focus on “green” issues, up from 3% in the previous plan. [July 2010. Military Implications, Sources¹⁴⁶]

Nordic Countries to Support Mekong Energy and Environment Partnership

The Ministry for Foreign Affairs of Finland and the Nordic Development Fund are supporting the Energy and Environment Partnership for the Mekong region, a program to promote the use of renewable energy, energy efficiency, and clean technologies in Cambodia, the Lao PDR, Thailand, and Vietnam. [Related items: *Climate Change Requires Water Management Changes* in February 2010 and *Unless Water Management Improves, Conflicts over Water Are Inevitable*

in August 2006 environmental security reports.] [September 2010. Military Implications, Source¹⁴⁷]

Coal-fired Power Plants under Fire

The U.S. Environmental Protection Agency is contemplating introducing rules to reduce environmental effects of coal-fired power plants as part of its steps on regulating greenhouse gas emissions. Additionally, a new rule for reducing the emissions of mercury from coal-fired power plants is to be issued November 2011 with enforcement three years later. It is estimated that this will force about 20% of U.S. coal-fired electric generation capacity to retire by 2015. Similarly, in Australia, the Greens are advocating 100% replacement of coal with renewable energy sources such as sun, wind, and wave. [July 2010. Military Implications, Sources¹⁴⁸]

PREVENTION AND ADAPTATION

Policy recommendations and Actions for Adaptation to Climate Change

The UNEP *Latin America and the Caribbean: Atlas of our Changing Environment* is highlighting environmental challenges in the region due to climate change, loss of biodiversity, deforestation, the impacts of mining and natural disasters, changes in land use, and degradation of coastal areas.

According to the ECLAC report *Economics of Climate Change in Latin America and the Caribbean*, in the region's temperate countries, losses from climate change may amount to around 1% of annual GDP by 2100 in the scenario of highest emissions (A2 of the IPCC). [December 2010. [Military Implications, Sources](#)¹⁵⁰]

A technical paper "Guiding principles for adaptation to climate change in Europe" by the European Topic Centre on Air and Climate Change of the European Environment Agency presents a set of guiding principles and implementation mechanisms for adaptation to climate change in Europe. The paper is based on opinions from more than 250 adaptation experts from 35 European countries, who took part in a survey conducted by the Potsdam Institute for Climate Impact Research and Effect.

More than 400 technical experts and policy makers met in Cairo, Egypt, November 2-3, at the Fifth Symposium on ICTs and the Environment & Climate Change (ICT = Information and Communication Technologies). Emphasizing the climate change monitoring and mitigation requirements of Africa and other developing regions that can be met through ICT solutions, the symposium issued the "Cairo Roadmap," a six-step program for the use of ICTs to benefit environmental management. [November 2010. [Military Implications, Sources](#)¹⁵¹]

Over 700 participants met in Addis Ababa, Ethiopia, for the Seventh African Development Forum under the theme of "Acting on Climate Change for Sustainable Development in Africa" from 12-15 October 2010. As one of the outcomes of the Forum, a partnership on Africa's options for a Green Economy, backed by the African Union, African Development Forum (AfDB), UN Economic Commission for Africa (UNECA) and UNEP, was established. One of the first activities of the partnership will be to organize an Africa-wide conference on a low-

carbon, resource-efficient Green Economy, scheduled to take place in 2011. [October 2010. [Military Implications, Sources](#)¹⁵²]

The United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) has launched a Regional Cooperative Mechanism on Drought Monitoring and Early Warning. The Mechanism will provide an information portal--the Asia-Pacific Gateway on Disaster Risk Reduction and Development -- and aims to provide satellite products for drought monitoring. It will assist members in developing locally tailored services to facilitate decision making.

“The World Disasters Report 2010” by the International Federation of Red Cross and Red Crescent Societies focuses on urbanization and climate change risk. It highlights that 2.57 billion urban dwellers living in low- and middle-income nations are exposed to unacceptable levels of risk fuelled by rapid urbanization, poor local governance, population growth, and poor health services. Urban planning should consider the effects of climate change to reduce vulnerability of millions of people, mostly those living in low-elevation coastal zones. Tackling urban risk is essential to reducing poverty and urban violence. [September 2010. [Military Implications, Sources](#)¹⁵³]

The World Bank’s *Synthesis Report on the Economics of Adaptation to Climate Change Study*, estimates the costs of adaptation to climate change to be between \$70-100 billion per year between now and 2050. The study argues that investments in adaptation should start with low-regret options: measures that tackle existing weather risks, such as increased investment in water storage in drought-prone basins or protection against storms and flooding in coastal zones and/or urban areas.

On August 16th, the UN launched the Decade for Deserts and the Fight Against Desertification, which will run from 2010 to 2020 with the goal of raising awareness and action to improve protection and management of the world’s drylands. The global launch took place in Fortaleza, Brazil, during the Second International Conference on Climate, Sustainability and Development in Semi-arid Regions (ICID 2010).

The UN Secretary-General launched a High-Level Panel on Global Sustainability to “explore approaches for building low-carbon, green and resilient economy” that can efficiently address together poverty and climate change. The High Level Panel’s report, to be issued by the end of 2011, will provide inputs into inter-governmental processes, including the Rio 2012 conference, and the annual meetings of the United Nations Framework Convention on Climate Change (UNFCCC).

The fifth Annual Meeting of the Pacific Disaster Risk Management Partnership Network took place 9-13 August 2010, in Suva, Fiji under the theme “Enhancing the Implementation of the Pacific Disaster Risk Reduction and Disaster Management Framework for Action through a Multi-stakeholder Approach.” The meeting aimed to, among other goals, share preliminary findings of the regional progress review in implementing the Regional Framework for Action (RFA) and strengthen South-South Cooperation with the Caribbean community. [August 2010. [Military Implications, Sources](#)¹⁵⁴]

The World Bank Institute has published a series of multimedia learning modules on Climate Adaptation for Water, Agriculture, and Natural Resource Management. The modules address issues including rehabilitating degraded watersheds; innovative cultivation strategies; legal aspects of water use; and public-private partnerships in irrigation management. The modules are

available at: <http://vle.worldbank.org/moodle/course/view.php?id=402> [July 2010. [Military Implications, Sources](#)¹⁵⁵]

Reports on Sustainability and Climate Change

The MIT Sloan School of Management has produced its *Special Report, The Business of Sustainability -Findings and Insights from the First Annual Business of Sustainability Survey and the Global Thought Leader's Research Project*, assessing how leading organizations are responding to sustainability-related business forces.

Informing an Effective Response to Climate Change, a new report by the National Research Council, “examines the types of information systems and communication tools needed to ensure that national, state, and local decision makers and the public base climate change policies and personal choices for responding on the best available science.” Among other conclusions, it calls for a systematic framework to effectively address challenges posed by climate change and for improved decision-taking and evaluation. The report is part of the America’s Climate Choices suite of studies. [July 2010. [Military Implications, Sources](#)¹⁵⁷]

FAO Launches Global Fire Information Management System

The UN Food and Agriculture Organization has launched the Global Fire Information Management System (GFIMS), a monitoring system that integrates remote sensing and GIS technologies to deliver MODIS hotspot/fire locations to natural resource managers and other stakeholders around the world. (MODIS is the Moderate Resolution Imaging Spectroradiometer on NASA’s Aqua satellite). It is offering almost real-time detection of emerging fires, and alerting users through an online portal or via e-mail, and soon by text messages. [September 2010. [Military Implications, Sources](#)¹⁵⁸]

New Global Land Cover Maps

A global land cover map was created by European Space Agency and the Belgian Université Catholique de Louvain using 12 months of 2009 data from Envisat’s Medium Resolution Imaging Spectrometer at a resolution of 300 m. (<http://ionial.esrin.esa.int/>)

A pan-European land cover and use map for 2009 created by ESA’s GlobCorine project is now available on-line. (<http://ionial.esrin.esa.int/globcorine/>)

The first regional atlas on the state of the environment in Latin America and the Caribbean, with more than 200 images illustrating the principal environmental issues of the region was prepared by UNEP in cooperation with others. (http://www.cathalac.org/lac_atlas/) The new on-line National Atlas of the U.S. produced by the USGS has scores of layers covering a wide range of environmental topics. (<http://nationalatlas.gov/>) [January 2011. [Military Implications, Sources](#)¹⁵⁹]

CLIMATE MODELING AND SCENARIOS

Climate Projection Models

A computer modeling of climate change to the year 3000 shows that even with zero CO₂ emissions beginning in 2100, climate change effects will continue for the next 1,000 years.

Regional changes in temperature and precipitation would still be considerable, although the global mean temperature would likely remain the same. The West Antarctic Ice Sheet would collapse by 3000, raising global sea levels by approximately 4 meters. The model was produced by researchers at the Univ. of Victoria and Univ. of Calgary in Canada. [January 2011. [Military Implications, Sources](#)¹⁶¹]

The Chalmers Climate Calculator is a simple climate model for online use, developed by Chalmers University of Technology. The model shows potential impacts on global temperature rise under different CO₂ emissions scenarios shaped by reductions' timeframes and scales, climate sensitivity, and the net aerosol forcing in year 2005. The model also allows visualizing the different impacts of emission cuts by Annex I and Non-Annex I countries, as well as the role of deforestation. The global model is accessible at: www.chalmers.se/ee/ccc, while the model considering Annex I grouping and deforestation is available at www.chalmers.se/ee/ccc2.

Similarly, an interactive climate map from Google shows potential future impacts of a 4°C global temperature rise, illustrating rising water levels and reduced crop yields in different parts of the world. The map is continuously updated as new data become available. It is available at: <http://www.fco.gov.uk/google-earth-4degrees.kml> (requires Google Earth installed.) [July 2010. [Military Implications, Sources](#)¹⁶²]

A new global study by climate scientist Aiguo Dai concludes that much of the world's land area is susceptible to extreme drought over the next 90 years. Using current GHG emission projections and the 22 computer models from the IPCC's 2007 report to gather information on temperature, precipitation, humidity, wind speed, and the planet's radiative balance, Dai calculated the Palmer Drought Severity Index (PDSI) through the end of the century. The report determines that drought risk will decrease across the upper reaches of the Northern Hemisphere and in some Southern Hemispheric locations, while increasing significantly in Africa, Australia, the United States, Southwest and Southeast Asia, Latin America, and the Mediterranean Sea region. There is concern that over the next 30 years regions are likely to experience drought of severity and duration that has not been experienced in at least the past several hundred years. [October 2010. [Military Implications, Sources](#)¹⁶³]

Scenarios

Forum for the Future (FF) with support from the British Department of International Development (DFID) has developed four scenarios exploring how climate change would transform low-income countries over the next 20 years. The study warns that unless strong and urgent action is taken, climate change would reverse years of work reducing poverty in the developing world. In addition, shortages of food and natural resources and climate change impacts could lead many nations to question the Western model of economic development and democracy. The study stresses that the impacts of climate change must be factored into development decisions to ensure they continue to yield benefits in the long-term. [July 2010. [Military Implications, Sources](#)¹⁶⁵]

C. Protecting the Environment Due to Its Inherent Moral Value ¹⁶⁶

ENVIRONMENTAL SECURITY-RELATED INTERNATIONAL REGULATIONS THAT HAVE BEEN OR ARE CLOSE TO COMING INTO FORCE SINCE JULY 2010

Broad Environmental Aspects

Progress on International Environmental Governance

The First Meeting of the Consultative Group of Ministers or High-Level Representatives on Broader International Environmental Governance Reform was held from July 7-9, 2010 in Nairobi, Kenya. The Consultative Group is formed of delegates from 59 countries. Using the original 24 points proposed by UNEP, the group identified nine options for further consideration. While there is general agreement that there are gaps in the current environmental governance system, views differ about potential solutions. Some countries favor creating a global policy organization with universal membership to manage the global environmental agenda, while others advocate a new specialized UN agency on the environment, or argue for an umbrella organization on sustainability. However, there is general support for other broad reforms, such as an encompassing global information network, establishing a tracking system on environmental finance, and enhancing UNEP presence within existing country offices. The Group agreed to a roadmap for its work through the 2011 Governing Council. The second meeting is tentatively scheduled for late November 2010 in Helsinki, Finland. [Related item: *UNEP Conference Furthers Environmental Governance* in February 2009 environmental security report.] [July 2010. Military Implications, Sources¹⁶⁹]

The Protocol on Strategic Environmental Assessment to the UNECE Espoo Convention Entered into Force on July 11, 2010

The Protocol on Strategic Environmental Assessment to the UNECE Espoo Convention sets the legal framework for better integration of environmental and health assessments, as well as public participation in decisionmaking at the earliest stage of projects and programs. It ensures that environmental protection and health concerns are an integral part of sustainable development. The SEA Protocol entered into force on July 11, 2010. [Related item: *Protocol on Strategic Environmental Assessment (SEA)* in May 2003 environmental security report] [July 2010. Military Implications, Source¹⁷⁰]

Repository of Multilateral Environmental Agreements

Multilateral Environmental Agreements: State of Affairs and Developments 2010, edited by Philip Drost, Senior Legal Counsel at the Directorate International Affairs, Netherlands Ministry of Housing, Spatial Planning and the Environment, is a repository of the texts of the most important global Multilateral Environmental Agreements, “including the most recent texts of Rules of Procedure, Financial Rules and Compliance Procedures.” The chapter “Year Ahead”

outlines the key negotiating issues for the forthcoming year. [July 2010. Military Implications, Sources¹⁷¹]

Biodiversity

New International Mechanisms Adopted for Protection of Biodiversity

The 10th Conference of the Parties of the Convention on Biological Diversity (CBD) held in Nagoya, Japan, adopted several new mechanisms for increasing protection of biodiversity and assessed new and emerging issues. The 2011-2020 Strategic Plan for Biodiversity identifies 20 targets, such as: expanding the world's protected areas to include 17% of terrestrial surface and 10% of the marine surface; the restoration of a minimum 15% of ecosystems already degraded; and halving, or bringing as close as possible to zero, the rate of loss of the world's natural habitats. The "Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization" will enter into force after 50 ratifications. The attendees also agreed that signatories to the CBD must ensure that no geoengineering projects take place until risks to the environment, as well as social, cultural, and economic impacts, have been properly assessed. A sample of other outcomes includes the: Global Biodiversity Outlook; Multi-year Programme of work; Biofuels and Biodiversity; and Invasive Alien Species. [Related item: *Biosafety Regulations Reviewed in Context of Worrying Forecasts* in October 2010 environmental security report.] [November 2010. Military Implications, Sources¹⁷³]

Chemicals and other Hazardous Compounds

Stockholm Convention Updates

Amendments Adding Nine Chemicals to the Stockholm Convention Entered into Force

Amendments to the Stockholm Convention on persistent organic pollutants (POPs) adding nine chemicals to Annexes A, B and/or C of the Convention entered into force on August 26, 2010 for the 152 of the 170 Parties to the Stockholm Convention that have not submitted a notification or a declaration. The amendments cover the following chemicals: alpha hexachlorocyclohexane; beta hexachlorocyclohexane; chlordecone; hexabromobiphenyl; hexabromodiphenyl ether and heptabromodiphenyl ether (commercial octabromodiphenyl ether); lindane; pentachlorobenzene; perfluorooctane sulfonic acid, its salts, and perfluorooctane sulfonyl fluoride; and tetrabromodiphenyl ether and pentabromodiphenyl ether (commercial pentabromodiphenyl ether). [Related item: *Stockholm Convention Updated with Nine New Chemicals* in May 2009 environmental security reports] [August 2010. Military Implications, Sources¹⁷⁵]

Stockholm Convention on Persistent Organic Pollutants (POPs) Updated

The sixth meeting of the Persistent Organic Pollutants Review Committee (POPRC-6) of the Stockholm Convention on Persistent Organic Pollutants (POPs) took place October 11-15, 2010 in Geneva, Switzerland. It formed a working group to prepare a draft risk management evaluation for hexabromocyclododecane (HBCD), risk management evaluation for endosulfan and recommended its listing in Annex A, with exemptions, risks of combined exposures, and other related conditions. The Committee considered a revised draft risk profile and further

evaluation of short-chained chlorinated paraffins (SCCPs), and it provided for increased harmonization of relations with the Basel Convention. [October 2010. Military Implications, Source¹⁷⁶]

EU Parliament Adopts Restrictions on Nanoproducts

The European Parliament reached agreement that “nano-sized ingredients and food from nanotech processes should be subject to novel foods regulations,” and called for a moratorium until specifically-designed risk assessments verify their safety. The action was welcomed by the European Environmental Bureau, Europe’s largest federation of environmental citizens’ organizations. [Related item: *EU Restrictions on Nanofoods Expected to Pass in July*, in June 2010 environmental security report.] [July 2010. Military Implications, Sources¹⁷⁷]

Germany publishes criteria for substances of very high concern

The Federal Institute for Risk Assessment (BfR) has published the criteria for selecting substances of very high concern (SVHC). BfR proposes the chemicals for Germany’s REACH (EU Regulation, Evaluation, Authorization and Restriction on Chemicals) candidate list. [Related items: *EU Updates the REACH System, and WEEE and RoHS Directives* in December 2008 and other chemicals-related items in previous environmental security reports.] [August 2010. Military Implications, Sources¹⁷⁸]

WATER

UN Resolution Acknowledges Access to Clean Water and Sanitation a Human Right

The UN General Assembly adopted a resolution recognizing access to clean water and sanitation as a human right, a move that might be a step forward towards a future treaty. The non-binding resolution received 122 votes in favor, no votes against, while 41 countries abstained—including Australia, Britain, Canada, and the U.S. Introducing the resolution, Bolivia’s representative pointed out that more children are killed annually by lack of access to water than by AIDS, malaria and measles combined, while lack of sanitation affects 40% of the world’s population. [August 2010. Military Implications, Sources¹⁷⁹]

UN Human Rights Council Affirms Right to Water as Legally-Binding

Water tables are falling on all continents; more than 40% of humanity gets its water from watersheds controlled by two or more countries. About 900 million people lack clean water and 2.6 billion lack adequate sanitation. The UN Human Rights Council adopted a resolution affirming that rights to safe drinking water and sanitation are basic human rights contained in existing human rights treaties, and therefore legally binding. The International Covenant on Economic, Social and Cultural Rights (ICESCR), the UN Convention on the Rights of the Child (CRC), the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), and the Convention on the Rights of Persons with Disabilities (CRPD) give rise to obligations for States parties in relation to access to safe drinking water and sanitation. This action addresses previous objections by those nations who abstained from supporting this right in the UN General Assembly in July this year. The UN Human Rights Council calls upon all States

to create the legal and procedural frameworks for assuring the implementation, monitoring and enforcement mechanisms “to achieve progressively the full realization of human rights obligations related to access to safe drinking water and sanitation, including in currently unserved and underserved areas.” [October 2010. Military Implications, Sources¹⁸⁰]

European Parliament Resolution on Jordan River Water Management Reform

The European Parliament has adopted a resolution on environmental and political concerns with regard to the Lower Jordan River area. It calls upon the leaders of Israel, Jordan, and Syria to address the humanitarian, security, and environmental threats posed by the Jordan River’s over-exploitation and mismanagement. An estimated 98% of the river’s freshwater has been redirected by Israel, Jordan, and Syria. Without intervention, large portions of the river are projected to run dry by 2011. This non-binding resolution opens the first official communication between the EU Parliament and these governments regarding the state of the Jordan River. [Related item: *Call for International Intervention to Save the Jordan River* in May 2006 environmental security report.] [September 2010. Military Implications, Sources¹⁸¹]

Marine Environment

IMO MEPC Revises MARPOL, Addresses Emissions from Ships

The 61st session of the International Maritime Organization’s (IMO) Marine Environment Protection Committee (MEPC), which took place 27 September-1 October 2010, in London, addressed technical, operational, and market-based measures. For the mitigation of emissions from maritime transport, it requested proposed amendments to Annex VI, the Energy Efficiency Design Index (EEDI) and the Ship Energy Efficiency Management Plan (SEEMP), with an intersessional meeting of the Working Group to be held in March 2011. It adopted the revised MARPOL Annex III for the Prevention of Pollution from Ships expected to enter into force on 1 January 2014. It was also approved, in view of adoption at its next session, an updated Annex V of the Convention on Regulations for the prevention of pollution by garbage from ships. [Related item: *Concerns over Maritime Air Pollution Increase* in February 2008 environmental security report.] [October 2010. Military Implications, Sources¹⁸³]

Chile Establishes 150,000 KM² Protected Marine Reserve in Pacific

Chile has established the 150,000 km² no-take Sala y Gómez Marine Park surrounding Sala y Gómez Island in the east Pacific, to protect what a National Geographic Ocean Fellow calls “one of the last undisturbed and relatively pristine places left in the ocean ... [with] deep seamounts with unique marine life.” [October 2010. Military Implications, Source¹⁸⁴]

Ecuador to Join the UN Convention on the Law of the Sea

President Rafael Correa of Ecuador announced the accession to the UN Law of the Sea, pending endorsement by the National Assembly. Ecuador is one of the 16 countries that neither signed nor ratified the Law of the Sea Convention, although it claimed a 200 nautical mile sovereignty zone even before the concept of the Exclusive Economic Zone was created by the Convention. By joining the UNCLOS, Ecuador’s claim to the 200-mile zone and the air space above will

become official, and also opens the opportunity for eventual claims of extension. [July 2010. Military Implications, Source¹⁸⁵]

New Technologies

Synthetic Biology Guidelines to Reduce Bioweapon Threats

Synthetic biological voluntary guidelines released October 13, 2010 by the U.S. Dept. of Health and Human Services call for sellers of synthetic double-stranded DNA products to know their buyers and their intended use. These guidelines will be reviewed and updated on a regular basis. Since synthetic biology could one day be misused to create bioweapons and potentially even weapons of mass destruction, international agreements to regulate this new technology seem both likely and warranted. The scale and scope of the expected future biological revolutions may one day require an international regulatory agency similar to the International Atomic Energy Agency. [October 2010. Military Implications, Source¹⁸⁷]

The EU Strengthens Legislation to Counter Cybercrime

The European Commission is developing legislation for criminalizing cyber attacks. A proposed Directive addressing cyber crimes is supplemented by a proposal for strengthening the European Network and Information Security Agency. The strategy also includes setting up a 24-hour alert system in each member state, where citizens and companies can announce attacks. The EU's anti-terrorism coordinator Gilles de Kerckhove said that "state-driven or state-sponsored attacks" are identified as the highest risk to cyber security. He also warned that while having an international "code of conduct" regulating the use of cyberspace would be helpful, an international legally binding treaty could also legitimize state controls over content. Cybercrime is also identified in the EU Internal Security Strategy action plan as one of the five main areas needing more coordinated strategy to help member countries counter rapidly developing security threats—along with organized crime, international terrorism, borders' management, and response to natural and man-made crises and disasters. It is likely that the international discussions over coordinated action to counter cybercrime will accelerate and lead to some binding legal frameworks. [Related item: *International Legal Frameworks Needed for Cybersecurity* in April 2010 environmental security report.] [December 2010. Military Implications, Sources¹⁸⁸]

Polution

New EU Directive on Industrial Polution

The European Commission adopted a stricter policy on industrial emissions. It is merging seven pieces of pre-existing environmental legislation including the IPPC Directive (2008/1/EC, integrated pollution prevention and control). New parameters include a more rigorous process for permits by strengthening the Best Available Techniques (BAT), tightening emission limits for Europe's largest fossil-fuel-fired combustion plants and improving compliance tools for better verification and control. The new Directive comes into force 20 days after publication in the Official Journal, which is expected before the end of 2010. Then the member States have two years to start implementation. [Related item: *EC Enforces Compliance with EU Environmental*

Regulations in June 2008 environmental security report.] [November 2010. Military Implications, Sources¹⁹⁰]

Waste Management

Kenya to Implement E-Waste Management Program

The 40 million metric tons of e-waste generated annually around the world is expected to increase, adding toxins throughout the environment. Kenya is set to become the first East African nation to develop regulations on the management of electronic waste, following a national conference held at the United Nations Environment Programme (UNEP) in Nairobi. Delegates from Kenya's Environment Ministry and National Environment Management Authority, Microsoft, UNEP, and the telecommunications industry attended to chart a common way forward in dealing with e-waste management in line with the Basel Convention and other international frameworks. [October 2010. Military Implications, Source¹⁹²]

PROPOSED TREATIES AND/OR CHANGES TO EXISTING ONES

Biodiversity

Prosecution of Pillage of Natural Resources as War Crime

At a conference held in The Hague, under the auspices of the Open Society Institute's Justice Initiative in coordination with the Dutch and Canadian governments, lawyers and human rights activists suggested legal instruments for prosecuting pillage of natural resources as a war crime. While this would primarily apply to companies profiting from the trade of "conflict minerals" and to cases that use resulting revenue to fund armed conflict, concerns also include environmental degradation and social aspects. The most notorious situation is the Democratic Republic of the Congo. Other countries on the "watch list" include: Brazil, China, India, Mexico, and Turkey. In a related development, the U.S. Dodd-Frank Act (H.R. 4173) becomes effective on April 11, 2011. It includes a clause requiring companies to report on the use of certain minerals from the Democratic Republic of the Congo and neighboring countries. Non-compliance will be fined. [Related item: *Natural Resources Fuel Violence in Eastern D.R. Congo* in September 2010 environmental security report.] [January 2011. Military Implications, Sources¹⁹⁵]

World's Humid Tropical Forests to Suffer Considerable Biodiversity Change by 2100

A study by Carnegie Institution's Department of Global Ecology reveals that the ecosystems of humid tropical forests will suffer profound changes due to combined effects of climate change and land use. Globally, only 18% to 45% of those forests' biodiversity might remain unchanged by the end of the century. The study identifies by region and ecosystem the combination, as well as the preponderant effect, of the different factors, thereby helping conservationists focus their efforts more efficiently. [Related items: *International Body to Monitor Biodiversity Destruction*

in June 2010 and other items on similar issues in previous environmental security reports.] [August 2010. Military Implications, Source¹⁹⁶]

Biosafety Regulations Reviewed in Context of Worrying Forecasts

The Meeting of the Parties to the Cartagena Protocol on Biosafety (COP/MOP 5) held October 11-15, 2010, in Nagoya, Japan, was preceded by the fourth meeting of the Group of Friends of the Co-Chairs on Liability and Redress in the context of the Biosafety Protocol, and followed by the tenth meeting of the Conference of the Parties to the Convention on Biological Diversity (CBD COP10). The meetings considered a series of strategic, content, and administrative issues, including new strategic plans and cooperation with other conventions, organizations and initiatives for improving capacity building, compliance and monitoring. The Nagoya-Kuala Lumpur Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety (the Supplementary Protocol) is expected to further strengthen and increase its efficiency. Meanwhile, the Living Planet Report 2010 produced by the World Wildlife Federation (WWF) in collaboration with Global Footprint Network and the Zoological Society of London, and released prior to the Nagoya meetings, details alarming biodiversity declines along with the warning that humanity's ecological footprint reached 1.5 times Earth's capacity to produce renewable resources and is producing CO₂ at a rate 50% faster than the Earth can sustain. The Economics of Ecosystems and Biodiversity (TEEB) report, launched at the CBD COP10, documents the multi-trillion dollar importance to the global economy of the natural world, and suggests policy-shifts and market mechanisms that could help curb biodiversity loss. According to the report, halving current deforestation rates alone by 2030 is worth \$3.7 trillion in global climate change adaptation savings. [Related item: *Strategic Plan for Biodiversity to Connect UN Conventions and UN Bodies* in September 2010 environmental security report.] [October 2010. Military Implications, Sources¹⁹⁷]

New Protected Areas Proposed in the Pacific

The Univ. of Queensland Ecology Centre's marine protection blueprint has determined that 50% of the oceans in the southwest of the country will need to be protected in a network of marine sanctuaries to minimize risks to marine life, fish stocks, and ecosystems. The Australian federal government intends to plan new marine sanctuaries in the southwest of Australia. Indonesia has declared a protected zone around three coral-rich islands near Bali. Palau's Minister of the Environment, Natural Resources and Tourism announced the establishment of a marine mammal sanctuary covering over 230,000 mi² (600,000 km²) of the nation's waters. [Related item: *Factors to Consider in Establishing and Operating Marine Protected Areas* in March 2010 environmental security report.] [November 2010. Military Implications¹⁹⁸]

Chemical and Biological Safety

International Biosecurity Initiative

U.S. Rep. Brad Sherman (D-Calif.), chair of the House Foreign Affairs Subcommittee on Terrorism, Nonproliferation, and Trade introduced the International Biosecurity Act of 2010 (HR 6297) to pursue efforts to establish international cooperation to counter both natural and man-made biological risks and assess the establishment of a global legal regime for biosecurity. The

bill might be included in the proposed WMD Prevention and Preparedness Act of 2010 (HR 5498), which is awaiting a House floor vote. [Related items: *BWC Meeting Improves International Resilience Systems to Address Infectious Disease and BioWeapons* in August 2009, *New Technologies Need New Regulations Systems* in March 2009, and other items in previous environmental security reports.] [October 2010. Military Implications, Sources²⁰⁰]

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New Regulations for Chemicals in California

California's Department of Toxic Substances Control (DTSC) is moving ahead with the regulation development phase of the state's Green Chemistry Initiative (AB 1879 and SB 509) to identify and prioritize chemicals for reduction or removal from consumer products. The preliminary list of Priority Chemicals will be published for public comment by June 1, 2012. The initiative is part of the larger state effort to regulate chemicals and includes the creation of a scientific advisory panel and toxics information clearinghouse with an Internet database component. Another California bill (revised SB 346) expected to get the governor's approval is a complex legal compromise which limits the content of copper and other materials, such as lead, mercury, chromium and cadmium in brake pads. [Related item: *New Substances Identified as Harmful to Human Health and the Environment* in June 2009 environmental security report.] [September 2010. Military Implications, Source²⁰²]

Greenhouse Gas Emissions

Post-Kyoto Protocol and Post-Copenhagen Negotiations

An update analysis on CO₂ emissions shows the global CO₂ emissions' decrease in 2009 by 1.3% appears to be only a "blip" on the radar due to the economic slowdown, with the emissions expected to return to the 3% yearly increase as the effects of the recession decline. The study also highlights that in 2009, while developed countries' carbon emissions fell—e.g. Japan (11.8%), United Kingdom (8.6%) and Germany (7%), they increased considerably in developing countries, mainly in China (8%) and India (6.2%).

As world attention turns towards the UN Climate Change Conference to be held in Cancun, Mexico, November 29-December 10, 2010, expectations of reaching agreement for a post-Kyoto greenhouse gas emissions treaty are low. Nevertheless, the high-profile meeting galvanized efforts and created the opportunity for holding many side-events that are all oriented toward improving energy efficiency, reducing GHG emissions, and promoting green technologies. [November 2010. [Military Implications, Sources](#)²⁰⁵]

Over 2,300 delegates from governments, intergovernmental organizations, and the media attended the Tianjin, China climate change negotiations, held October 4-9, 2010. This was the last meeting before the climate summit to be held in Cancun, from November 29 to December 10, 2010. There was no significant progress, mainly due to the reluctance of the developing countries to meet the demands of the developed countries on measurement, reporting, and verification mechanisms. A revised Chair's proposal (FCCC/KP/AWG/2010/CRP.3) will be considered further in Cancun. As an alternative to the failure of reaching agreement for a second commitment period of Kyoto, the EU is considering creating a 'coalition of the willing' for continuing the fight to reduce GHG emissions. In the meantime, WWF warns that unless there are strong policies to fight GHG emissions, their worldwide level could overshoot by a third the threshold beyond which dangerous global warming looms. [October 2010. [Military Implications, Sources](#)²⁰⁶]

In preparation for the next session discussing the commitments for the Annex I Parties, to be held in Tianjin, China, October 4-9, 2010, the UNFCCC Secretariat has published several documents, including a draft proposal with amendments to the Kyoto Protocol <http://unfccc.int/resource/docs/2010/awg14/eng/12.pdf>. [September 2010. [Military Implications, Sources](#)²⁰⁷]

The Bonn negotiations for a post-Kyoto protocol, held August 2-6, 2010, made progress on planning for the substance of the November-December 2010 Climate Change Conference in Mexico. It also focused on the scale of emission reductions from Annex I parties to the Protocol subsequent to the 2012 commitment period. The draft text was further developed and will form the basis for negotiations in Tianjin, China, in October, with the outcomes to be considered in Cancun, Mexico, in November.

At the 41st Annual Meeting of the Pacific Islands Forum (PIF), held August 3-6, 2010 in Port Vila, Vanuatu, the leaders of Smaller Island States discussed a consolidated Pacific position for the concurrent Cancun climate change conference, as well as potential international funding mechanisms related to the Copenhagen Accord. [August 2010. [Military Implications, Sources](#)²⁰⁸]

The World Investment Report 2010 by UNCTAD notes that current national and international policy frameworks do not target private sector and transnational corporation contributions sufficiently and effectively, and underlines the importance of integrating international investment policies into the negotiations and design of the new post-2012 regime. The report proposes a global partnership to synergize investment and climate change mitigation for promoting sustainable development. One of the components of the proposal is setting up an international low-carbon technical assistance center (L-TAC).

Environmental and economic effects of the Copenhagen pledges and more ambitious emission reduction targets, a report by Germany's Federal Environment Agency (UBA), notes that the emission reduction targets of the world's major CO₂ emitters under the Copenhagen Accord are not yet sufficient to limit global warming to 2°C. Meantime, it shows that economic costs in terms of reduced GDP compared to baseline GDP in 2020 are no higher than 0.25%, assuming that emission allowances are traded globally. For the EU, the impact on GDP between 30% CO₂ reduction (instead of 20%) by 2020 compared to 1990 levels would be marginal.

Climate Stabilization Targets: Emissions, Concentrations, and Impacts Over Decades to Millennia by the National Research Council today assesses the levels of CO₂ reduction that would be necessary to stabilize climate at less than 2°C average global warming. It notes that efforts are needed imminently for a rapid decline to less than 80% of current emissions by mid-century. [July 2010. [Military Implications, Sources](#)²⁰⁹]

Cancún UN Climate Change Conference Consolidates Progress

The UN Climate Change Conference held in Cancún, Mexico, November 29-December 10, 2010, included the 16th session of the Conference of the Parties to the UN Framework Convention on Climate Change and the 6th session of Conference of the Parties to the Kyoto Protocol. Although no legally-binding outcomes emerged, the “Cancún Agreements” helped to reverse the pessimism from the stalled negotiations during the Copenhagen conference on climate change. The Cancún Agreements include: 1) long-term cooperative action for reducing greenhouse gas emissions and eventually keeping global warming under 2°C by the end of the century; 2) improved monitoring and reporting of national commitments by developed and developing countries; 3) enhanced action for adaptation, including establishing the Cancun Adaptation Framework, an Adaptation Committee, and a work program on loss and damages; 4) creation of the Green Climate Fund with a pledge of \$100 billion a year by 2020 to help developing countries reduce emissions and adapt to climate change; 5) acceleration of technology transfer; 6) strengthening of REDD+ (reduce emissions from deforestation and forest degradation) for lowering (or not raising) rates of deforestation (including fair treatment of indigenous people); and 7) capacity building. There were also around 20 other decisions covering administrative, financial, and institutional matters. The next Conference of the Parties to the UNFCCC is scheduled to be held in Durban, South Africa, November 28 December 9, 2011. [December 2010. [Military Implications, Sources](#)²¹⁰]

International Civil Aviation Pact Cuts Climate Emissions from Aircraft

The Assembly of the International Civil Aviation Organization (ICAO) adopted a global agreement and roadmap for reducing greenhouse gas emissions from aircraft through 2050. Some key elements: improving aviation fuel efficiency 2% per year up to 2050; a framework for development and deployment of alternative fuels; and CO₂ emission standards for aircraft by 2013. The ICAO Environmental Report 2010 launched at the Assembly brings together scientific, technological, economic, political and regulatory aspects of aviation environmental protection. [Related item: *Provisional Agreement for Including Aviation in the Emission Trading Scheme from 2012* in June 2008 environmental security report.] [October 2010. [Military Implications, Sources](#)²¹¹]

More Aggressive Action Needed to Curb Ozone Depletions

In *The Scientific Assessment of Ozone Depletion 2010* by UN, EU, and US organizations present a comprehensive analysis of the effect of stratospheric ozone changes on the Earth’s surface climate and of the effects of climate change on stratospheric ozone. It also includes several scenarios, finding that leakage from ozone-depleting substance (ODS) banks are the largest source of current ozone-depleting potential and warns that delaying capture and destruction of chlorinated fluorocarbon compound (CFC) bank leakage beyond 2011-2015 could reduce the possible ozone and climate benefits by about 30%. The report also includes policy

options and recommendations. [Related item: *Call for Expanding Montreal Protocol on Ozone-Depleting Substances* in September 2007 environmental security report.] [January 2011. Military Implications, Sources²¹²]

New Technologies

Reports Assessing Several Nations' S&T Advances

S&T Strategies of Six Countries: Implications for the United States outlines the S&T infrastructure of Japan, Brazil, Russia, India, China, and Singapore with details of each nation's priorities, weaknesses and areas of expertise, with predictions for each nation's medium term (3- to 5-year) implementation success, including economic and military outcomes. The study finds that the transinstitutional globalization of ST&I networks in conjunction with S&T's centrality to JBRICS economic-security agendas creates a unique challenge to U.S. competitive advantage in information, intelligence and economics. The report recommends the U.S. create better models for international monitoring of S&T while simultaneously creating the alliances, policies and culture that will stimulate U.S. education and investment in innovation and still protect national assets. The report notes that while certain standard indicators of S&T accurately measure some elements of S&T advancement across nations, new country-specific indicators are needed that more succinctly measure nuances of individual country environments.

Ranking the Nations on Nanotech: Hidden Havens and False Threats, a report by Lux Research, assesses 19 nations and ranks them according to the potential of their nanotechnology capabilities using conventional indicators. The authors state that in 2009 some nations significantly increased their spending and commitment to nanotech, while others have surpassed the U.S. in nanotechnology commercialization. [August 2010. Military Implications, Sources²¹⁴]

Nanotechnology

[ISO Published Standard for Inhalation Toxicity Testing of Nanoparticles](#)

[ISO Publishes Methodology for Nanomaterials Classification](#)

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[Regulation of Products Containing Nanoscale Materials](#)
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[Voluntary Initiatives, Regulation, and Nanotechnology Oversight: Charting a Path](#)
[Webinars on Nanotech Regulation Offered](#)
[New Book Addresses Nanotechnology Education and Workforce Training](#)
[Studies Discussing the Possibility of Understanding Nanotoxicology](#)
[Management of Nanomaterials Safety in Research Environment](#)

ISO Published Standard for Inhalation Toxicity Testing of Nanoparticles

The International Organization for Standards (ISO) has published an International Standard to support the inhalation toxicity testing of nanoparticles: ISO 10808:2010, Nanotechnologies – Characterization of nanoparticles in inhalation exposure chambers for inhalation toxicity testing. An ISO official states, “In order to test inhalation toxicity it is necessary to monitor concentration, size and size-distribution of nanoscale particles in an inhalation chamber. Traditional methods used in other areas are considered insufficient for testing nanoparticles since parameters specific to them like particle surface area or number, might be crucial determinants of toxicity.” [January 2011. Military Implications, Sources²¹⁶]

ISO Publishes Methodology for Nanomaterials Classification

The International Organization for Standardization has published a technical report, *ISO/TR 11360:2010, Nanotechnologies – Methodology for the classification and categorization of nanomaterials*, which offers a comprehensive, globally harmonized methodology for classifying nanomaterials. According to Nanowerk News, it “introduces a system called the 'nano-tree', which places nanotechnology concepts into a logical context by indicating relationships among them as a branching out tree. The most basic and common elements are defined as the main trunk of the tree, and nanomaterials are then differentiated in terms of structure, chemical nature and other properties.” [August 2010. Military Implications, Source²¹⁷]

The Geopolitics of Nanotech

ETC Group, a Canadian NGO, has released a 68-page report, *The Big Downturn? Nanogeopolitics*, which “revisits nano’s geopolitical landscape, providing a current snapshot of global investment, markets, governance and control, including intellectual property.” The report devotes 24 pages to questions of nanotech regulation and public communication, pointing out that “industry is increasingly nervous about its health and environmental exposure.” [December 2010. Military Implications, Source²¹⁸]

Organizations Address Key Issues For Nanomaterial Definition

According to Nanowerk News, "The International Council of Chemical Associations (ICCA) has released a document addressing key issues that need [to be] addressed when considering the definition of manufactured nanomaterials for regulatory purposes. It advocates five 'Core Elements of a Regulatory Definition of Manufactured Nanomaterial' ". The proposed elements are: solid, particulate substances, intentionally manufactured at the nano-scale, with at least one dimension between 1 and 100nm, and their aggregates and agglomerates, with a weight based cut-off of either 10 wt.-% or more of nano-objects or 50 wt- % or more of aggregates / agglomerates consisting of nano-objects.

The Center for International Environmental Law and the European Environmental Bureau submitted on behalf of a consortium of 46 organizations comments on the European Commission's proposed definition of "nanomaterial". The Reply begins by cautioning, "The present understanding of nanomaterials properties and potential health and environmental impacts is still very limited and therefore warrants much research and careful evaluation." [November 2010. Military Implications, Sources²¹⁹]

EC on Definition of Nanomaterials For Regulatory Purposes

Responding to a request of the European Parliament, the EC Joint Research Centre (JRC) published a reference report, Considerations on a definition of nanomaterial for regulatory purposes. According to Nanowerk News, "The report discusses possible elements of a definition aiming at reducing ambiguity and confusion for regulators, industry, and the general public. It recommends that the specific term 'particulate nanomaterial' should be employed in legislation to avoid inconsistencies with other definitions and that size should be used as the only defining property." Meantime, the European Commission has requested that the Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) provide advice on the essential elements of a science-based working definition of "nanomaterials." Part of this process is a public consultation on the preliminary version, in which stakeholders are invited to submit comments and proposals. [July 2010. Military Implications, Sources²²⁰]

EC Committee Presents Scientific Basis for the Definition of "nanomaterial". According to nanowerk.com, the EC's Scientific Committee for Emerging and Newly Identified Health Risks (SCENIHR) has published a 46-page paper – Scientific Basis for the Definition of the Term "nanomaterial, in which it basically concludes that size should be the basis for this definition. The Executive Summary from the paper briefly lays out the multitude of considerations and qualifications related to this complex question. [December 2010. Military Implications, Sources²²¹]

EU Gearing Up for Active Nanotech Regulatory Year in 2011

Nanowerk News reported on a conference, held within the framework of the Belgian Presidency of the EU, on the development of nanomaterials management and information tools. The Belgian Minister for Energy, Environment, Sustainable Development and Consumer Protection stated, "We await the next European Environment and Health Action Plan which is expected to address the challenge of nanomaterials among its priority areas. In 2011, the Commission will also have to respond to the European Parliament Resolution adopted in April 2009, on the regulatory aspects of nanomaterials. According to the resolution, various ambitious measures will be taken

in order to ensure safety with regard to nanomaterials and nanotechnology." The Minister put forward proposals for five specific responses. [September 2010. Military Implications, Source²²²]

European Officials Discuss Nanotech Regulation

Government officials from Germany, Austria, Switzerland, and Liechtenstein met at the 4th International Nano Authorities Dialogue, organized by the Innovation Society, St.Gallen, focusing on legal and technical issues about the insurability and regulation of nanotechnologies. According to a news release, key elements of the presentations were that "nanotechnologies must be insurable, ...the potential risks of manufactured nanomaterials for human health and the environment must be thoroughly and continuously monitored, and ... the exchange of safety information between the industry and the authorities and along the value chain plays an important role to ensure that risks are identified in an early phase and measures can be taken proactively." [September 2010. Military Implications, Sources²²³]

New Report Analyzes European Nanotech Issues

According to Meridian Nanotechnology and Development News, the NanoCode Project, a UK-based group comprising the Royal Society, Insight Investment, the Nanotechnology Industries Assoc., and the Nanotechnology Knowledge Transfer Network, has published a Synthesis Report, "with the goal of exploring the societal and economic impact of the technical, social and commercial uncertainties related to nanotechnologies ... [and providing] a broad overview of current codes of conduct, voluntary measures and practices", also comparing them with the EC's proposed Code of Conduct. Nanowerk News has prepared a brief review of the 49-page report. [October 2010. Military Implications, Source²²⁴]

New EU NanoSustain Project Aims for Sustainable Solutions for Nanotechnology

The NanoSustain is a consortium comprising 12 partners from 8 different countries. The objective of the NanoSustain project is to develop innovative solutions for the sustainable design, use, recycling and final treatment of nanotechnology-based products, based on hazard characterization and life-cycle assessment (LCA). "This will be achieved by comprehensive data gathering and generation of relevant missing data, as well as their evaluation and validation for specific nano-products or product groups in relation to their human health and environmental hazards and possible impacts that may occur during after-production stages." [July 2010. Military Implications, Sources²²⁵]

EU Launches Public Consultation on Risk Assessment of Nanomaterials in Food

According to Nanowerk News, "...the European Food Safety Authority (EFSA) has launched a public consultation on its draft guidance document for engineered nanomaterial (ENM) applications in food and feed ... [that] sets out for applicants, the data needed to understand the specific properties of the ENM, allowing a risk assessment to be carried out." [January 2011. Military Implications, Source²²⁶]

German Paint Association Issues Nanomaterials Workplace Guidance

The German Paint and Printing Ink Association published a guideline document to inform its members on the responsible handling of nanoscale materials at the workplace. [July 2010. Military Implications, Sources²²⁷]

EPA Issues Final Significant New Use Rules (SNUR) on Carbon Nanotubes

The EPA has issued final Significant New Use Rules (SNUR) for single- and multi-walled carbon nanotubes, which had been the subject of premanufacture notices (PMN P08177, P08328). Persons who intend to manufacture, import, or process either of these materials for a use that is designated as a significant new use by the final rule must notify EPA at least 90 days before commencing that activity. EPA states that it believes the SNURs are necessary because these chemical substances may be hazardous to human health and the environment. [September 2010. Military Implications, Sources²²⁸]

GAO Tells EPA It Should Expand Nanomaterials Info and Regulatory Efforts

A new GAO report, Nanotechnology: Nanomaterials Are Widely Used in Commerce, but EPA Faces Challenges in Regulating Risk, says EPA should proceed with previously announced plans to increase the information the agency has on nanomaterials and expand its oversight of them. The EPA has said it agrees, and concurred with the GAO recommendations. [July 2010. Military Implications, Sources²²⁹]

Discussion on Federal/State Regulation of Nanotech

A recent article in Nanotechnology Now, We Should Have Seen It Coming: States Regulating Nanotechnology, discussed the increasing trend for individual states to consider or enact nanotech regulations, reflecting a discontent with actions (or inaction) on the part of the federal government. A subsequent piece, State-level nano regulation: Yes, indeed, the industry "should have seen it coming" – it caused it!, appeared in an Environmental Defense Fund blog, and attributed that trend indirectly to the nanotech industry's efforts to block or weaken federal controls. [September 2010. Military Implications, Sources²³⁰]

California Asks Manufacturers for Nano Analytical Test Measures

The California Department of Toxic Substances Control (CDTSC) has issued a call to manufacturers for information regarding analytical test methods for nanosilver, nano zero valent iron, nano titanium dioxide, nano zinc oxide, nano cerium oxide, and quantum dots, citing the almost total lack of such information. [December 2010. Military Implications, Source²³¹]

Thailand Moves Toward Nanotechnology Safety and Ethics Strategy Plan

According to Nanowerk News, the Thai National Nanotechnology Center, NANOTEC, and the Nanotechnology Assoc. of Thailand are working on the country's first strategy plan on nanotech safety and ethics, to be submitted to the government in 2011, with full regulation expected in five years. [January 2011. Military Implications, Source²³²]

Thailand to Introduce New "NanoQ" Certification Mark

According to Meridian Nanotechnology and Development News, the Nanotechnology Association of Thailand will launch a certification mark, NanoQ, in 2011, to encourage domestic development of nanoproducts and to promote consumers' acceptance of such products. Companies wishing to obtain the NanoQ mark will be required to have their products tested by the National Nanotechnology Center, and undergo a yearly auditing process. [October 2010. Military Implications, Source²³³]

India Soon to Have a National Regulatory Framework for Nanotechnology

According to the Times of India, the country will soon have a national regulatory framework for nanotechnology, according to the Union minister for science and technology and earth sciences. The minister said that there are close to 1,000 researchers working in the nanotechnology field, and, "The framework will be drafted to sort out issues of ethics and copyrights [sic; presumably patents]" [October 2010. Military Implications, Source²³⁴]

Pakistan Establishes National Nanotech Commission; Environment a Focus

The government of Pakistan has established a National Commission on Nano-Science and Technology (NCNST) with a mandate to help universities and research centers set up nanotech laboratories. Dr. Aftab Ahmed, President of the National Academy of Young Scientists, pointed out that one of the most important applications of nanotechnology is the environment, where nanoparticles significantly increase the efficiency of groundwater pollutants filtration. [August 2010. Military Implications, Source²³⁵]

Effort and Care Vital in Communicating Nanotech to the "Public"

Several recent articles have emphasized the care that must be taken in communicating to the "public" the benefits and risks of nanotech-based products. The first, in Nature Nanotechnology, by Fern Wickson of the GenØk - Centre for Biosafety in Tromsø, Norway, and colleagues, emphasizes that communications must be tailored to the specific character and background of the recipients – who should not just be lumped into categories of laypersons, consumers, or stakeholders. The second is a report from the UK consultancy College Hill, discussed by Meridian Nanotechnology and Development News, that warns that "more than 90 percent of the UK population is confused or concerned about purchasing food containing manufactured nanoparticles, with 38 percent saying they would be unlikely to buy such foods", and urges the food and beverage industry, "...to consider how they can best educate, prepare and inform the public." [October 2010. Military Implications, Sources²³⁶]

Study Analyzes Stakeholder Preferences in Regulating Nanotechnology

According to Meridian Nanotechnology and Development News, a recent analysis conducted by Steffen Foss Hansen, a postdoctorate student at the Technical Univ. of Denmark, used Multicriteria Mapping (MCM) to study why some nanotechnology regulatory options, such as bans, moratoriums, and voluntary measures, are deemed to be either acceptable or unacceptable to various stakeholders in the United States. His findings are quoted as saying, "[A]dopting an incremental approach and implementing a new regulatory framework have been evaluated as the

best options whereas a complete ban and no additional regulation of nanotechnology were the least favorable." [July 2010. Military Implications, Sources²³⁷]

ASTM Forms New Subcommittee on Nano-Enabled Consumer Products

The ASTM International (formerly the American Society for Testing and Materials) Committee E56 on Nanotechnology has announced formation of a subcommittee to develop standards for nanotech-using consumer products. It will develop standard terms, toxicity test methods, workplace handling guidance and other voluntary standards for organizations that work with nano-materials, concentrating initially on nano-silver. The group is soliciting responses from experts to work with the new subcommittee, including in the area of environmental chemistry. [October 2010. Military Implications, Source²³⁸]

Nanotechnology Long-term Impacts and Research Directions: 2000-2020

The National Science Foundation sponsored a study, conducted by the World Technology Evaluation Center, with 200 experts from 35 countries, on the long-term view for nanotechnology. Workshop presentations and the draft report, in particular its 46-page Chapter 4, Nanotechnology Environmental, Health, and Safety Issues, are now available. [October 2010. Military Implications, Sources²³⁹]

What Can Nanotechnology Learn from Biotechnology?

What Can Nanotechnology Learn from Biotechnology? is a collection of papers by experts--proponents and opponents--reviewing the social, environmental, ethical, and regulatory issues of nanotechnology by comparison to biotechnology controversies, mainly in agricultural and food-related applications. [July 2010. Military Implications, Sources²⁴⁰]

Report Outlines Nanotech Research Directions for Societal Needs in 2020

The Wilson Center/Pew Trusts' Project on Emerging Nanotechnologies has issued a new report, *Nanotechnology Research Directions for Societal Needs in 2020*, that, according to Meridian Nanotechnology and Development News, "...outlines the foundational knowledge and infrastructure development in the last decade, the current ~\$15 billion in R&D programs underpinning about \$250 billion of products incorporating nanoscale components in the world in 2009, and the likely evolution towards a general purpose technology by 2020." [November 2010. Military Implications, Sources²⁴¹]

International Handbook on Regulating Nanotechnologies

A new 648-page International Handbook on Regulating Nanotechnologies seems to be a comprehensive examination of the regulatory challenges presented by nanotechnologies, with speculations on potential future evolution of the regulatory landscape, including, "potential legislative responses that could be employed by governments [and] a range of other options available to stakeholders," says the press release. [November 2010. Military Implications, Sources²⁴²]

Chemical Heritage Foundation Issues Two Reports on Nanotech Regulation

The Chemical Heritage Foundation's Studies in Sustainability series has issued two white papers on nanotechnology regulation. The two titles are *Emerging Nanotechnologies and Life-Cycle Regulation: An Investigation of Federal Regulatory Oversight from Nanomaterial Production to End of Life* and *Nanotechnology Regulation: Policies Proposed by Three Organizations for the Reform of the Toxic Substances Control Act*. [November 2010. Military Implications, Sources²⁴³]

Regulation of Products Containing Nanoscale Materials

According to Meridian Nanotechnology and Development News, this article, prepared by lexology.com, addresses regulatory issues of nanotechnology and takes an in-depth look at how the EPA, FDA, and OSHA, "...have dealt with nanotechnology regulation since a November 2007 memorandum from the Office of Science and Technology Policy, and the Council on Environmental Quality, stated that federal agencies 'must implement sound policies to protect public health and the environment' from risks related to nanotechnology." [November 2010. Military Implications, Sources²⁴⁴]

Review of the Long History of Nanosilver Usage and Regulation, and Implications

A recent paper, *120 Years of Nanosilver History: Implications for Policy Makers*, points out that nanosilver in the form of colloidal silver has been used for more than a century and has been registered as a biocidal material in the U.S. since 1954, and states, "it would be a mistake for regulators to ignore the accumulated knowledge of our scientific and regulatory heritage in a bid to declare nanosilver materials as new chemicals, with unknown properties and automatically harmful simply on the basis of a change in nomenclature to the term 'nano.'" [January 2011. Military Implications, Source²⁴⁵]

Voluntary Initiatives, Regulation, and Nanotechnology Oversight: Charting a Path

The Wilson Center/Pew Trusts' Project on Emerging Nanotechnologies has issued a 56-page report, *Voluntary Initiatives, Regulation, and Nanotechnology Oversight: Charting a Path*, that, according to the Project's director, "...is the most extensive analysis done to date of how voluntary programs can be applied to managing nanotechnology's possible environmental and health effects [with] ... analysis and recommendations [that] extend beyond nanotechnology to the newer generation challenges that we face as science rapidly advances." [November 2010. Military Implications, Sources²⁴⁶]

Webinars on Nanotech Regulation Offered

The Keller Heckman law firm is offering a webinar series *Nanotechnology Today 2010*, focusing on state regulation of nanotechnology in the absence of national regulation, the impact of nanomaterial regulation in Europe and North America, environmental applications of nanotechnology, and benefits and risk communication for nanomaterials. The series will comprises four sessions, in July, September, October, and November, and can be purchased for either live on-line viewing or three post-session on-demand viewings of each event. [July 2010. Military Implications, Source²⁴⁷]

New Book Addresses Nanotechnology Education and Workforce Training

According to an item in *Meridian Nanotechnology and Development News*, the new book *Nanoscience Education, Workforce Training, and K-12 Resources*, by Miguel Aznar, of the Foresight Institute, is divided into four parts:

- Historical perspective and the emerging technology
- Teaching the skills for understanding and evaluating the emerging technologies
- The current status of, and links to, teaching materials, and evaluation of the US model vs. elsewhere
- Plans of action and links to sustainable development tools

[November 2010. Military Implication, Source²⁴⁸]

Studies Discussing the Possibility of Understanding Nanotoxicology

David B. Warheit from the DuPont Haskell Global Centers for Health and Environmental Sciences and colleagues has written an article addressing five issues that they perceive to be myths and misconceptions regarding nanotoxicology, generally related to the complex relationships, still the subject of much research, between the chemical and physical properties of nanomaterials and their biological effects. The emphasis of the paper is on the deficiencies in current knowledge and its application and the need for a very large amount of further detailed investigation before specific nanomaterials can be fully "trusted".

Similarly, a study paper produced by the German Federal Environment Agency (Umweltbundesamt) on the release and behavior of nanoparticles in the environment indicates, not too surprisingly, that the characteristics they exhibit depend on a multitude of factors, both of the material and the environment through which they pass – factors whose effects are as yet largely unknown in detail. The materials tested were nanosilver, titanium dioxide, carbon black, and cerium oxide. The study concludes, "...current knowledge is insufficient for making any generalised statements which are relevant for risk assessment." [November 2010. Military Implication, Sources²⁴⁹]

Management of Nanomaterials Safety in Research Environment

According to *Meridian Nanotechnology and Development News*, "This article ... presents a practical, 'user-friendly' procedure for university-level safety management of nanomaterials. ... The procedure ... involves classifying laboratories into risk classes, with a list of risk mitigation measures given for each hazard level." It is currently being implemented at the Ecole Polytechnique de Lausanne, Switzerland, in more than 100 research labs. [December 2010. Military Implications, Source²⁵⁰]

Biotechnology

Bioethics Commission Calls for Enhanced Federal Oversight of Synthetic Biology

The Presidential Commission for the Study of Bioethical Issues has released its first report, *New Directions. The Ethics of Synthetic Biology and Emerging Technologies* – a comprehensive review of the emerging field of synthetic biology, including 18 recommendations, covering such topics as the risks likely to be encountered and approaches to regulation. With respect to seven of

those 18, the Commission recommends “ongoing review by the government, in consultation with the relevant scientific, academic, international, and public communities, with initial action completed within 18 months and made public.” [December 2010. Military Implications, Sources²⁵¹]

NRC Committee Recommends Sequence-based Tracking of Possible Pathogens

The Sequence-Based Classification of Select Agents: A Brighter Line report by the National Research Council (NRC) recommends moving to a DNA-sequence-based classification system for the regulation of dangerous pathogens. “The US regulates a list of 82 pathogens and toxins ... deemed to pose a biosecurity threat, ...[b]ut currently, nothing identifies them beyond taxonomic labels, such as *Bacillus anthracis* for anthrax.... The report also describes a ‘yellow flag’ biosafety system that would address sequences of concern — snippets of DNA that are not in themselves select agents, but could be part of one or otherwise used to produce a bioweapon,” writes Nature News. [August 2010. Military Implications, Sources²⁵²]

Space

India Urges Strengthening Outer Space Treaty

The “Space, Science, and Security” conference held in New Delhi, January 19-21, 2011, addressed eventual updates to the Outer Space Treaty to better address security aspects. Keynote speaker Air Chief Marshal S. Krishnaswamy, India’s former head of the Air Force, in addition to amendments to the Treaty, suggested establishing, “a strong policing force in the UN,” to prevent militarization of space. He underlined that the new amendments should specifically outlaw installing nuclear and other weapons of mass destruction, as well as establishing military bases or conducting testing or military maneuvers in space or on celestial bodies. However, any research and use of equipment for peaceful purposes shall not be prohibited. The conference was organized by Observer Research Foundation, Secure World Foundation, and Stockholm International Peace Research Institute. [Related item: *Steps for an International Regime for Space Debris and Space Traffic Control System* in May 2009 environmental security report.] [January 2011. Military implications, Sources²⁵³]

IMPROVED ENFORCEMENT OF ENVIRONMENTAL REGULATIONS

“Public Interest” Environmental Suits Increasing

Reportedly, in the past twenty years, tens of thousands of public interest lawsuits have been filed against the Indian government and corporations on grounds, among others, that large development projects threaten livelihoods, land, or the environment. These suits have led to landmark rulings on education, the environment, and human rights (PILs can relate to any public issue, not just the environment), but their volume has burdened the judicial system. Therefore, in an effort to reduce the caseload, the Indian government has introduced new directives, requiring higher standards of proof and sanctioning the petitioner if a project was delayed by a public interest litigation that is later dismissed. Note: similar public interest legal provisions as those in India are also included in jurisprudence in South Africa, Pakistan, Nepal, and Bangladesh.

[Related item: *Environmental Courts and Tribunals Are Rapidly Increasing Around the World* in April 2010 environmental security report, as well as Item 4 on European SEA in this report.]. [July 2010. Military Implications, Source²⁵⁵]

International Consortium Created to Curb Environmental Crime

The International Consortium on Combating Wildlife Crime (ICCWC) came into effect, by the signing of a Letter of Understanding by the heads of five organizations: INTERPOL, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the UN Office on Drugs and Crime (UNODC), the World Bank, and the World Customs Organization. In the same spirit, the resolution adopted by INTERPOL's 79th General Assembly, attended by 650 delegates from 141 countries, underlines that environmental crime is "multi-disciplinary in nature due to the complexity and diversity of crime types." Since it is "not restricted by borders and involves organized crime networks...", a global response is needed, with INTERPOL and the National Central Bureaus playing a leading role. The resolution also stipulates that environmental crime impacts the global economy and security, and recommends that INTERPOL form the Environmental Crime Committee. [November 2010. Military Implications, Sources²⁵⁶]

The ICC to Establish an Independent Oversight Mechanism

The 9th session of the Assembly of States Parties to the Rome Statute of the International Criminal Court, held December 6–10, 2010, was attended by representatives of the 114 ICC States Party and over 150 NGOs. The decisions adopted include a resolution on creating an Independent Oversight Mechanism and its operational mandate, to enhance the Court's efficiency. The IOM's working procedures will be set out in a manual over the coming year, to be adopted at the next Assembly of States Parties, in December 2011. An omnibus resolution, "Strengthening the International Criminal Court and the Assembly of States Parties," covers a wide range of policy and practical issues relating to the ICC and international criminal justice. [Related item: *Updates of the Rome Statute Include Amendments on the Crime of Aggression and Expansion of Criminalizing the Use of Certain Weapons in Non-international Conflicts* in July 2010 environmental security report.]. [December 2010. Military Implications, Sources²⁵⁷]

Strategic Plan for Biodiversity to Connect UN Conventions and UN Bodies

Representatives of biodiversity-related conventions met for the first time on September 1, 2010 in Switzerland to improve international environmental governance. Participants agreed that the 2011-2020 strategic plan should provide a framework for all biodiversity-related conventions and UN bodies. Capacity-building activities should be coordinated among the conventions, and national biodiversity strategies and action plans updated to cover implementation of all biodiversity-related conventions. The Strategic Plan is expected to be adopted at the 10th meeting of the COP to be held in October 2010, in Nagoya, Japan. A Nordic symposium on synergies among biodiversity-related MEAs, held earlier this year in Helsinki, noted that considering impediments, six conventions form a potentially manageable and coherent cluster: CBD, CITES, CMS, Ramsar, WHC and ITPGRFA, while the CBD, UNFCCC and UNCCD cluster would assure a better integration of biodiversity with climate change issues. Enhancing cooperation and coordination among the biodiversity-related MEAs follows the success of the synergies developed among the three on chemicals and waste—the Basel, Rotterdam and

Stockholm Conventions (see *First Joint Meeting of the Main Conventions on Hazardous Chemicals to Improve International Environmental Governance* in February 2010 report). [September 2010. Military Implications, Sources²⁵⁸]

UN Review of Sustainable Development in Preparation for Rio+20 in 2012

The First Intersessional Meeting for the UN Conference on Sustainable Development in preparation for the Rio+20 to be held in 2012 took place January 10-11, 2011. The advanced unedited version of the Synthesis Report presented to the delegates is a comprehensive assessment on the implementation of Agenda 21 and the Barbados Programme of Action, based on feedback from member states and UN agencies. It identifies, “Low political priority for integrated decision making...” (para. 44) as nations’ most important challenge, while, “Unclear mandates, low accountability, competition for funds, conflicting interests, the absence of institutional mechanisms for joint work and collaboration all exacerbate these [implementation] problems, which are also reflected in the UN system.” (para. 50) [Related item: *UN Reform Report Stresses Environmental Issues* in March 2005 environmental security report.] [January 2011. Military Implications, Sources²⁵⁹]

International Atomic Fuel Banks to Reduce Nuclear Proliferation

Following the March 2010 agreement with the IAEA, the Russian government opened the world’s first reserve of low enriched uranium (LEU) at the International Uranium Enrichment Center in Angarsk, Siberia. The plant is holding 120 metric tons of LEU enriched between 2.00% and 4.95%, a safe level compared with the 90% enrichment required for weapons grade uranium. The LEU reserve is intended for IAEA member states, and is part of the global effort to control nuclear proliferation. Separately, on December 3, 2010, the IAEA Board of Governors decided to establish an IAEA LEU bank that will be owned and managed by the IAEA; the location has yet to be identified. [Related items: *Advancements on Non-proliferation and Nuclear Disarmament* in May 2009, and *Advancements on Denuclearization* in April 2010 environmental security reports.] [December 2010. Military Implications, Sources²⁶⁰]

Prosecution of Pillage of Natural Resources as War Crime

At a conference held in The Hague, under the auspices of the Open Society Institute’s Justice Initiative in coordination with the Dutch and Canadian governments, lawyers and human rights activists suggested legal instruments for prosecuting pillage of natural resources as a war crime. While this would primarily apply to companies profiting from the trade of “conflict minerals” and to cases that use resulting revenue to fund armed conflict, concerns also include environmental degradation and social aspects. The most notorious situation is the Democratic Republic of the Congo. Other countries on the “watch list” include: Brazil, China, India, Mexico, and Turkey. In a related development, the U.S. Dodd-Frank Act (H.R. 4173) becomes effective on April 11, 2011. It includes a clause requiring companies to report on the use of certain minerals from the Democratic Republic of the Congo and neighboring countries. Non-compliance will be fined. [Related item: *Natural Resources Fuel Violence in Eastern D.R. Congo* in September 2010 environmental security report.] [January 2011. Military Implications, Sources²⁶¹]

Regional Cooperation in Africa to Counter Wildlife Trafficking

Africa's only wildlife law enforcement NGO, Last Great Ape Organization (Laga), has coordinated successful transinstitutional 'sting' operations against wildlife crime in Cameroon, Gabon, CAR and DR Congo. For the first time, Gabon has jailed ivory dealers. The Laga founder noted, "African governments have started realizing international trafficking has to be fought internationally. These arrests in four neighboring countries are a warning... – no longer can you hide on the other side of a border." [December 2010. Military Implications, Sources²⁶²]

Hazardous E-waste Grows as Major Environmental Problem

More than 12 countries participated in the International Hazardous Waste Inspections Exercise at Seaports. The exercise was coordinated by the International Network for Environmental Compliance and Enforcement's (INECE) and the Seaport Environmental Security Network (SESN). Initial results indicate that 54% of the 72 total targeted inspections showed infringements. "The illegal waste streams most often encountered during the event were: e-waste wrongly declared as second-hand goods, waste batteries wrongly described as plastic or mixed metal scrap, and cathode ray tubes from television and computer monitors wrongly classified as metal scrap," said INECE. [Related item: *Half of Transported European Hazardous Waste Could Be Illegal—How Much More Elsewhere?* in April 2008 environmental security report.] [November 2010. Military Implications, Sources²⁶³]

Shipping Efficiency Database to Reduce Emissions from Maritime Transportation

Shippingefficiency.org is a database developed by the Carbon War Room, aiming to reduce greenhouse gas emissions from maritime shipping. The database contains energy efficiency ratings for over 60,000 international vessels based on the IMO's Energy Efficiency Design Index. While global shipping is responsible for about 3% of total man-made CO₂ emissions, 15% of the global fleet is responsible for 50% of all emissions. The new database will be helpful for monitoring and enforcing the Ship Energy Efficiency Management Plan and the expected revised regulations for mitigation of emissions from maritime transport. [Related item: *IMO MEPC Revises MARPOL, Addresses Emissions from Ships* in October 2010 environmental security report.] [December 2010. Military Implications, Sources²⁶⁴]

NEW STANDARDS WITH ENVIRONMENTAL SECURITY IMPLICATIONS

Revised Standards Proposed for Corporate Greenhouse Gas Reporting

The World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD) released proposed new standards for how companies should report the GHG impact of their supply chains and products. These guidelines supplement the Corporate Accounting and Reporting Standard, which is (in turn) part of the GHG Protocol Initiative, which is a larger framework for calculating and reporting a company's environmental footprint. [Related item: *Corporate CEOs Pledge Actions on Climate Change at UN Global Compact Summit* in July 2007 environmental security report.] [November 2010. Military Implications, Sources²⁶⁶]

Comments Invited on EPA/DOT Proposed Heavy Truck Mileage/Emission Standards

EPA and the Dept. of Transportation announced a comprehensive, proposed national program to reduce greenhouse gas emissions and improve fuel efficiency of heavy-duty trucks and buses. This is projected to reduce GHG emissions by nearly 250 million metric tons and save 500 million barrels of oil over the lives of the vehicles produced within the program's first five years. [Related item: *EPA Proposes Tougher Air-Quality Rules* in January 2010 environmental security report.] [November 2010. Military Implications, Sources²⁶⁷]

ISO Publishes Methodology for Nanomaterials Classification

The International Organization for Standardization has published a technical report, *ISO/TR 11360:2010, Nanotechnologies – Methodology for the classification and categorization of nanomaterials*, which offers a comprehensive, globally harmonized methodology for classifying nanomaterials. According to Nanowerk News, it "introduces a system called the 'nano-tree', which places nanotechnology concepts into a logical context by indicating relationships among them as a branching out tree. The most basic and common elements are defined as the main trunk of the tree, and nanomaterials are then differentiated in terms of structure, chemical nature and other properties." [August 2010. Military Implications, Source²⁶⁸]

Fuel Efficiency Standards Are Changing around the World

UNEP in cooperation with other agencies has developed guidelines on sustainable procurement of vehicles for the UN. Recent reports by international organizations are pointing to the need for globally harmonized standards for assessing the efficiency of different fuels and relevant new technologies. The UN Industrial Development Organization (UNIDO) report *Motor Systems Efficiency Supply Curves* notes the lack of a transparent methodology for quantifying the energy efficiency of motor systems and insufficient data for documenting present and future cost effectiveness potentials. The International Energy Agency's *50by50 Prospects and Progress* report calls for global fuel economy reduction to about 8L/100km with emissions halved in new automobiles by 2030 and in all automobiles by 2050 (by the Global Fuel Economy Initiative). A European expert group states that alternative fuels could replace fossil fuels by 2050. A RAND Corporation study *Alternative Fuels for Military Applications* concludes that the military should direct its efforts more towards increasing energy efficiency rather than investing in alternative fuels. [January 2011. Military Implications, Sources²⁶⁹]

International Air Cargo Screening Cooperation Requested

The executive director of the Airforwardsers Association cargo industry group asked the U.S. Transportation Security Administration to bring shipping countries together to share screening methods for inbound international packages on passenger planes to meet deadlines. The lack of international standardized procedures impedes the implementation of a global system. [January 2011. Military Implications, Source²⁷⁰]

MISCELLANEOUS SAFETY ISSUES

New Earth-Approaching Asteroid Discovered

The Hawaii-stationed Panoramic Survey Telescope & Rapid Response System (Pan-STARRS) detected its first potentially hazardous object (PHO) September 16th and predicted the 150-ft diameter asteroid would pass within four million miles of Earth by mid-October 2010. This is 16 times the distance between the Earth and the Moon. In March 2009 a different asteroid came 80% closer to the Earth than the Moon. No one knew it was coming. Although the more recent asteroid was not a threat, it will be catalogued and monitored with other known objects that may pose a danger within the next fifty years. Although scientists believe many of the largest PHOs have been discovered, there is concern that many with diameters less than one mile (5,280 ft.) are still unknown. Pan-STARRS is considered the world's most sophisticated system for PHO detection. [Related item: *Steps for an International Regime for Space Debris and Space Traffic Control System* in May 2009 environmental security report.] [October 2010. Military Implications, Sources²⁷¹]

Hungary Industrial Plant Spill Might Trigger Tougher Environmental Regulations

Approximately 700,000 cubic meters (184 million gallons) of heavy-metal-contaminated sludge has impacted at least 40 km² (15.4 mi²) of territory, including what appears to be pollution of the Danube, due to a sludge spill from a bauxite refinery in Ajka, Hungary, a town 160 kilometers (100 miles) from Budapest. Experts warn that the chemically polluted sludge could flow from Hungary to countries downstream, polluting the water and agricultural land. The Danube basin is historically linked to the mining and industrial farming industries. Chemicals such as copper, manganese, and cadmium already contaminate its tributaries, while pollutants have accumulated in soils, sediments, and groundwaters of the region. Research conducted after the Ajka spill suggests there may be hundreds, possibly thousands, of unreported chemical facilities without jurisdictional clarity “orphaned” by the fall of communism and with failing containment infrastructures in the basin, posing a chemical “time bomb” threat. International liability and redress issues are likely. [October 2010. Military Implications, Sources²⁷²]

Study Indicts Swimming Pool Disinfectants for Toxic Effects from Byproducts

According to Science Daily, research by Professor Michael Plewa of the University of Illinois at Urbana-Champaign and colleagues has linked the application of disinfectants in recreational pools to previously published adverse health outcomes such as asthma, bladder cancer, and DNA damage: “negative outcomes can occur when disinfection byproducts form reactions with organic matter [e.g., sweat, hair, sunscreen] in pool water”. The scientists recommend that disinfectants containing bromine be avoided. [July 2010. Military Implications, Source²⁷³]

Artificial Grass May Pose Threat of Lead Poisoning to Children

The Agency for Toxic Substances and Disease Registry in Atlanta GA has reported that some artificial grass can begin to release lead dust after a few years of wear and tear. It found lead levels above US legal safety limits for 12 out of 29 synthetic surfaces tested, as well as in two out of four new artificial turf products. The turf manufacturers' association claims that other US studies have concluded children are not at risk. [Relevant item: *Call for Global Ban on Lead-*

based Paints in October 2007 environmental security report.] [October 2010. Military Implications, Sources²⁷⁴]

China to Expand Weather Control Program

Reportedly, the Director of the China Meteorological Administration has said that chronic water shortages in parts of the country will worsen over the coming decades, and therefore the need for using weather-control technologies will increase. China already began last year to allocate a special budget for weather control activities, and spending grew 19% in the first ten months of 2010, to \$114 million. [Related item: *Chinese Use of Weather Modification Technologies Might Cause Disputes* in July 2004 environmental security report.] [December 2010. Military Implications, Source²⁷⁵]

Nanotechnology--Potential Environmental and Health Implications

Study Raises Doubts on PEN Nano Consumer Products Inventory (CPI)
 Lack of Nanoparticle Characterization Obstructs Development of Nanomedicines
 Structured Relationship Modeling Allows Prediction of Nanoparticle Properties
 Sunscreens with ZnO, TiO₂ Nanoparticles May Pose Health Risk
 Study Shows TiO₂ Nanoparticles Disrupt Aquatic Ecosystems
 New Model Predicts Nanoparticle Cellular Toxicity
 Transatlantic Partners to Analyze Environmental Safety and health (EHS) for
 Manufactured Nanomaterials
 Toxicity of Silver Nanoparticles Increases During Storage
 Some Types of Nanotubes Produce Harmful Oxygen in Sunlit Water
 Nanosilver Compound Turns Up in Municipal Wastewater
 French Lab to Be Set up for Study of Nanotube Toxicity in Aqueous Environments
 Mouse Model Shows Reversible Reproductive Damage from Nanotubes
 Scientific Review on Using Nanomaterials in Construction Materials
 Use of TiO₂ Nanoparticles in City Pavement Raises Risk Questions
 Reports on nanotechnology-related safety

Study Raises Doubts on PEN Nano Consumer Products Inventory (CPI)

A recent study, published in *Nanotechnology Law & Business*, of the Consumer Products Inventory (CPI) prepared by the Wilson Center/Pew Trusts' Project on Emerging Nanotechnologies came to the conclusion that the CPI has substantive deficiencies that call the validity of claims associated with the CPI into question. It also recommends a commitment of resources at the governmental level to produce and maintain a consumer product inventory. [July 2010. Military Implications, Source²⁷⁷]

Lack of Nanoparticle Characterization Obstructs Development of Nanomedicines

An item in *NatureNews*, discussing the recent first international workshop on nanotech medicines held by the European Medicines Agency (EMA) in London, reports on statements by several experts that the lack of reliable characterization techniques for nanoparticles, and the consequent inability to analyze and understand nanoparticle/biosystem interactions and possible

hazards, are obstructing the development of nanomedicines. [September 2010. Military Implications, Source²⁷⁸]

Structured Relationship Modeling Allows Prediction of Nanoparticle Properties

Scientists led by Prof. Alexander Tropsha of the Univ. of NC School of Pharmacy have developed a structured modeling technique by which the biological effects of manufactured nanoparticles (MNPs) can be predicted using their chemical, physical, and geometrical properties. [November 2010. Military Implications, Sources²⁷⁹]

Sunscreens with ZnO, TiO₂ Nanoparticles May Pose Health Risk

Petra Kocbek of the Faculty of Pharmacy, University of Ljubljana, Slovenia, and colleagues have published a paper indicating that long-term exposure to zinc oxide and titanium dioxide nanoparticles, such as are found in sunscreen, has adverse effects on human skin cells in vitro, and that such materials are therefore a potential health risk. [October 2010. Military Implications, Sources²⁸⁰]

Study Shows TiO₂ Nanoparticles Disrupt Aquatic Ecosystems

A paper by environmental engineers April Gu and Carla Cherchi of Northeastern University in Boston reports that titanium dioxide nanoparticles, at the levels found in wastewater, "...could disrupt an aquatic ecosystem's carbon and nitrogen cycles", after experiments using a blue-green alga, *Anabaena variabilis*. [January 2011. Military Implications, Sources²⁸¹]

New Model Predicts Nanoparticle Cellular Toxicity

Enrico Burello and Andrew Worth of the EC's Joint Research Centre in Ispra, Italy have developed a new theoretical model that predicts which materials will make nanoparticles that could damage living cells. The model matches available electronic energy levels in the nanoparticle structure with the oxidation potentials of reactions that would either remove antioxidants from cells or generate reactive oxygen species (ROS) like hydrogen peroxide or superoxide ions. The researchers are trying to add factors besides oxidative stress. [July 2010. Military Implications, Source²⁸²]

Transatlantic Partners to Analyze Environmental Safety and health (EHS) for Manufactured Nanomaterials

According to Nanowerk News, in Phase 2 of the Environmental Nanoscience Initiative, scientists from the UK and the US will collaborate on three major research projects:

- a risk assessment for manufactured nanoparticles used in consumer products;
- an investigation of how nanomaterials are transported into sewage treatment systems, soil and surface waters and sediments, and a range of organisms;
- an examination of the rate and behavior of nanomaterials carried into agricultural soil and absorbed into its biota, as well as new knowledge from a unique pilot-scale waste water treatment facility." [January 2011. Military Implications, Sources²⁸³]

Toxicity of Silver Nanoparticles Increases During Storage

A new report, co-authored by Prof. Matthias Epple, of the University of Duisburg-Essen, Essen, Germany, shows that the toxicity of silver nanoparticles increases during storage because of their slow dissolution and the consequent release of silver ions. Further quantitative details of the process, e.g. behavior when a containing material is washed, still remain to be investigated. [August 2010. Military Implications, Sources²⁸⁴]

Some Types of Nanotubes Produce Harmful Oxygen in Sunlit Water

A study by Chia-Ying Chen and Chad T. Jafvert of the Purdue University School of Civil Engineering, West Lafayette IN, has shown that single-walled carboxylated nanotubes dispersed in water and exposed to sunlight produce a variety of cell-damaging reactive oxygen species (ROS). This generation had been known in the presence of laser light, but not for natural illumination. [August 2010. Military Implications, Sources²⁸⁵]

Nanosilver Compound Turns Up in Municipal Wastewater

According to an Environmental Defense Fund blog, scientists in The Center for NanoBioEarth at Virginia Tech identified and characterized silver sulfide* nanoparticles in the sewage sludge produced by an operating municipal wastewater treatment plant. This is the first time that such material has been detected in a field-scale study. It is not certain, although stated as "likely", that the material detected in the sludge originated from products containing silver nanoparticles that were converted to sulfides in the processing.

* - The blog post incorrectly identifies the nanoparticles as potentially toxic silver rather than the correct characterization as inert silver sulfide, as stated in the original paper. [September 2010. Military Implications, Sources²⁸⁶]

French Lab to Be Set up for Study of Nanotube Toxicity in Aqueous Environments

A French component of the international firm Arkema, together with the Centre national de la recherche scientifique (CNRS), the Institut National Polytechnique de Toulouse, and the Université Paul Sabatier have agreed to establish a joint research laboratory, NAUTILE (NAnotUbes et écoToxIcoLogiE), dedicated to the study of the ecotoxicological impact of carbon nanotubes (CNTs) in aquatic environments. [September 2010. Military Implications, Source²⁸⁷]

Mouse Model Shows Reversible Reproductive Damage from Nanotubes

Bing Yan, Director of the High-Throughput Analytical Chemistry Facility at St. Jude Children's Research Hospital, Memphis TN, and colleagues conducted a nanotoxicology study on the impact of carbon nanotubes on male reproductive health in a mouse model. Although the ill effects found were reversible and did not affect the hormonal levels, sperm health, or male mice fertility, the authors emphasize that further studies are urgently needed. [August 2010. Military Implications, Source²⁸⁸]

Scientific Review on Using Nanomaterials in Construction Materials

Prof. Pedro J. Alvarez at Rice University and colleagues compiled a report listing current uses of nanomaterials in various construction applications and highlighting potential and promising future uses. They also outline benefits, exposure scenarios, and impact mitigation measures. [July 2010. Military Implications, Sources²⁸⁹]

Use of TiO₂ Nanoparticles in City Pavement Raises Risk Questions

The TiO₂ nanoparticles used for air purification in city pavement in Antwerp allegedly agglomerate to a larger molecule with a size of 1.5 µm, and so escape suspicion of possibly producing “nanoparticle pollution”, but questions have been raised about their long-term fate – whether weathering over the decades may result in their release in their original form or in a form that may be degraded after inhalation., creating an environmental problem. Dr. Anil Kumar Suresh of the Biological and Nanoscale Systems Group, Oak Ridge National Laboratory, warns, “There’s not much known about the fate, transport and transformation of these particles in the environment. The area is not so explored and we cannot tell what will happen if the concentration of nanoparticles increases in the atmosphere. We have to be very careful”, a reasonable warning considering the widespread use of TiO₂-containing materials. [December 2010. Military Implications, Source²⁹⁰]

Reports on nanotechnology-related safety

According to an announcement, a new report outlines six regulatory and educational issues that should be considered whenever nanoparticles are going to be used in pesticides. Several issues specific to exposure to NBPs are discussed, including: (1) disclosures of nanoparticle characteristics in product formulations; (2) additional uncertainty factors for NBPs with inadequate data; (3) route-specific approaches for assessing exposure; (4) testing with the commercial form of NBPs; (5) initiation of a health surveillance program; and (6) development of educational programs. [October 2010]

Exposure Assessment: Recommendations for Nanotechnology-Based Pesticides

<http://www.iioeh.com/index.php/iioeh/article/view/1482>

New Approaches Needed to Gauge Safety of Nanotech-based Pesticides

<http://oregonstate.edu/ua/ncs/archives/2010/oct/new-approaches-needed-gauge-safety-nanotech-based-pesticides>

OECD has published two new documents in its *Series on the Safety of Manufactured Nanomaterials*:

No. 27: List of Manufactured Nanomaterials and List of Endpoints for Phase One of the Sponsorship Programme for the Testing of Manufactured Nanomaterials: Revision

A list of representative manufactured nanomaterial selected by the OECD Working Party on Manufactured Nanomaterials (WPMN) for use in its work.

[http://www.oecd.org/officialdocuments/displaydocumentpdf?cote=env/jm/mono\(2010\)46&doclanguage=en](http://www.oecd.org/officialdocuments/displaydocumentpdf?cote=env/jm/mono(2010)46&doclanguage=en)

No. 28: Compilation and Comparison of Guidelines Related to Exposure to Nanomaterials in Laboratories

An overview of recently published guidelines regarding the usage of nanomaterials in a laboratory scale.

[http://www.oecd.org/officialdocuments/displaydocumentpdf?cote=env/jm/mono\(2010\)47&doclanguage=en](http://www.oecd.org/officialdocuments/displaydocumentpdf?cote=env/jm/mono(2010)47&doclanguage=en)

[December 2010]

A new OECD Report Sums Up Current Developments in Nanomaterial Safety. According to Nanowerk News, "a new document from the OECD, Current Developments/Activities on the Safety of Manufactured Nanomaterials, provides information on current/planned activities related to the safety of manufactured nanomaterials in OECD member and non-member countries that attended at the 7th meeting of OECD's Working Party on Manufactured Nanomaterials (Paris France, 7-9 July 2010)", as well as written reports on relevant current activities in other international organizations such as International Organization for Standards (ISO), FAO, and the WHO. [September 2010]

Environment Directorate Joint Meeting of the Chemicals Committee and the Working Party on Chemicals, Pesticides and Biotechnology

[http://www.oecd.org/officialdocuments/displaydocument/?cote=env/jm/mono\(2010\)42&doclanguage=en](http://www.oecd.org/officialdocuments/displaydocument/?cote=env/jm/mono(2010)42&doclanguage=en)

The Institut de recherche Robert-Sauvé en santé et en sécurité du travail in Montreal has released the second edition of its report, *Engineered Nanoparticles: Current Knowledge about Occupational Health and Safety Risks and Prevention Measures*. According to Nanowerk News, the 153-page report concludes, "As for health hazards, many toxicological studies on different substances have demonstrated toxic effects on various organs. It is found that in general, an NP will normally be more toxic than the same chemical substance of larger dimensions, but it is currently impossible to determine which measuring parameter for exposure is best correlated with the measured effects." It also calls for a preventive and even precautionary approach and emphasizes the enormous need for developing new knowledge. [September 2010.]

Engineered Nanoparticles. Current Knowledge about OHS Risks and Prevention Measures

<http://www.irsst.qc.ca/files/documents/PubIRSST/R-656.pdf>

BfR, the German Federal Institute for Risk Assessment, has published three reports on German opinions and attitudes about nanotechnology-related risks.

Delphi Study on Nanotechnology: Expert Survey of the Use of Nanomaterials in Food and Consumer Products discussed nine general risk criteria and nine nano-specific test criteria.

Perception of Nanotechnology in Internet-based Discussions: The risks and opportunities of nanotechnology and nanoproducts: results of an online discourse analysis according to Nanowerk News, has as its purpose "to analyse German-language online discussions of nanotechnology in an attempt to identify the perceived risks, opportunities, benefits and expectations associated with this field of research and development."

Risk Perception of Nanotechnology – Analysis of Media Coverage report examines 2001-2007 media coverage of nanotechnology in almost 1700 articles published in German newspapers and magazines.

German Federal Institute for Risk Assessment publishes three new reports on nanotechnology

<http://www.nanowerk.com/news/newsid=17898.php>

According to *Nanowerk News*, the focus of the report *Engineered Nanomaterials: Feasibility of establishing exposure standards and using control banding* in Australia* “is to investigate the feasibility of:

- establishing group-based Australian National Exposure Standards for engineered nanomaterials
- using control banding for engineered nanomaterials in Australia.”

[*“Control banding” is a workplace risk assessment technique]

Its discussion begins with a detailed analysis of a similar study done earlier by the British Standards Institution. [August 2010]

Engineered Nanomaterials: Feasibility of establishing exposure standards and using control banding in Australia

http://www.safeworkaustralia.gov.au/NR/rdonlyres/CFEFDBA0-2BD5-4110-A49F-04A4C9032C18/0/Engineered_Nanomaterials_feasibility_establishing_exposure_standards_August_2010.pdf

New Safe Work Australia report investigates feasibility of exposure standards for nanomaterials
<http://www.nanowerk.com/news/newsid=17524.php>

Engineered Nanomaterials: Investigating substitution and modification options to reduce potential hazards provides a review of the current state in Australia of nanotech risk assessment and mitigation. The 81-page report presents the results of a “survey of the current substitution/modification practices used in Australian nanotechnology-related activities and a literature review in order to determine the potential substitution/modification options that may reduce the toxicity of engineered nanomaterials used in Australia,” says *Nanowerk*. The study was commissioned by Safe Work Australia and conducted by RMIT University, Melbourne. [August 2010]

Engineered Nanomaterials: Investigating substitution and modification options to reduce potential hazards

http://www.safeworkaustralia.gov.au/NR/rdonlyres/A47FBE60-DC28-44A1-A601-653B6EBD3890/0/Investigating_substitution_modification_options_reduce_potential_hazards.pdf

Safe Work Australia publishes reports on methods to reduce the risk of exposure to nanomaterials
<http://www.nanowerk.com/news/newsid=17525.php>

Proceedings of the International Conference on Safe production and use of nanomaterials, Nanosafe 2010, November 16-18, 2010 in Grenoble, France, are now available on-line. Topics at the event included:, Exposure assessment, Characterization, Detection and Monitoring, Nanomaterials life cycle, Toxicology, Environmental impact, Nanoparticle release from consumer products, Personal protection equipment, Secure industrial production, Safety parameters evaluation, Standardization, and Regulations. [December 2010]

NanoSafe 2010 presentations now available online

<http://www.nanowerk.com/news/newsid=19267.php>

Poster presentations at Nanosafe 2010

<http://www.nanosafe.org/scripts/home/publigen/content/templates/show.asp?P=119&L=EN&SYNC=Y>

Oral presentations at Nanosafe 2010

<http://www.nanosafe.org/scripts/home/publigen/content/templates/show.asp?P=118&L=EN&SYNC=Y>

2. Military Implications and Sources

¹ NATO's New Strategic Concept Includes Environmental Security

Military Implications:

Referencing the quotation above from the strategic concept adopted in Lisbon, the Army Strategy for the Environment should be made available to all relevant personnel in NATO, with suggestions for collaboration on how environmental security aspects in crisis management, conflict resolution, and general strategic planning might be enhanced.

Sources:

Active Engagement, Modern Defence. Strategic Concept for the Defence and Security of the Members of the North Atlantic Treaty Organisation adopted by Heads of State and Government in Lisbon

http://www.nato.int/cps/en/natolive/official_texts_68580.htm

EU-US Summit in Lisbon, Portugal: Joint Statement

http://eurunion.org/eu/index.php?option=com_content&task=view&id=3926&Itemid=58

² NATO Continues to Develop Cyber Defense Policies

Military Implications:

Military personnel with cyber security expertise and their NATO counterparts should collaborate on creating global cybersecurity strategy, agreements, and enforcement measures.

Source:

Developing NATO's cyber defence policy

http://www.nato.int/cps/en/natolive/news_70049.htm

³ Germany to Propose Adding Climate Change to UN Security Council Agenda

Military Implications:

Military personnel involved in UN peacekeeping and military-to-military planning and training should anticipate increased requirements for future missions related to adaptation to climate change, from increasing weather disasters to human resettlements and food shortages.

Sources:

Security Council must tackle climate change: Germany

<http://www.france24.com/en/20101213-security-council-must-tackle-climate-change-germany>

Surge in Demand for Humanitarian Assistance in High-Risk Environments Informs General Assembly Debate on Strengthening UN Disaster Relief Assistance

<http://www.un.org/News/Press/docs/2010/ga11038.doc.htm>

⁴ Environmental Aspects Should Be Factored More Into Conventional Security Concerns

Military Implications:

While these are only reinforcing issues already on the agenda of defense and security organizations, they provide new motivations for increased attention to human and environmental security as main components of 21st century global security. Continued and expanded training is needed to ensure that any force sent to a conflict or disaster zone is competent enough at least ‘do no harm’ to the environment, as much as possible.

Sources:

Environment key to U.S. security: Congress briefing

<http://www.reuters.com/article/idUSTRE68L5NR20100922>

Conventional versus Human Security: How Climate Risks Decrease Stability

<http://pisaspeak.wordpress.com/2010/09/04/conventional-versus-human-security-how-climate-risks-decrease-stability/>

⁵ UN Official Calls to “Securitize the Ground” as part of Human Security

Military Implications:

Relevant military personnel should explore how the concept of “securitizing the ground” would affect policy as a factor in conflict prevention and resolution.

Source:

The Third Annual Caux Forum for Human Security. 9-16 July 2010, Caux Switzerland

Grounding security (Soil security a prerequisite for human security). Luc Gnacadja speech

<http://www.unccd.int/publicinfo/docs/lghumansecurity.pdf>

⁶ International Consortium Created to Curb Environmental Crime

Military Implications:

AFRICOM and military personnel in other regions working in countries with governments with weak local customs or security organizations should consider how they might conduct military-to-military activities to help implement the intentions of the Consortium and explore cooperation on the full range of international environmental crime-related activities with the Consortium.

Sources:

World's police at INTERPOL General Assembly rally against environmental crime

<http://www.interpol.int/Public/ICPO/PressReleases/PR2010/News20101110.asp>

Powerful alliance to fight wildlife crime comes into effect

<http://www.interpol.int/Public/ICPO/PressReleases/PR2010/PR098.asp>

AG-2010-RAP-08, Appendix. Resolution: Subject: Sustainable Environmental Crime Programme

http://www.cites.org/eng/news/press/2010/20101108_Interpol_resolution.pdf

⁷ Environment-related Issues Dominate the UN General Assembly Debate

Military Implications:

Military and security organizations should increase efforts to identify ways to cooperate with relevant international and national organizations in addressing the causes and effects of climate change, forecast how they might be called upon for both mitigation and adaptation, and perform a gap analysis in anticipation of future requests. The increasing attention being accorded to the general relationships between environment and security makes it increasingly probable that UN peacekeeping operations will be mandated to deal with environmental issues. If so, then increasing military-to-military assistance and training in these matters will be needed.

Sources:

General Assembly of the United Nations. General Debate: 65th Session, statements

<http://gadebate.un.org/>

Security Council holds first strategic reassessment in nearly 20 years

<http://www.un.org/apps/news/story.asp?NewsID=36107&Cr=security+council&Cr1=>

We can end poverty 2015. UN Summit, 20-22 September 2010

<http://www.un.org/en/mdg/summit2010/>

⁸ The UN and African Union to Increase Cooperation for Peace and Security

Military Implications:

If not already done, AFRICOM and other military and security entities in Africa should connect with the Joint Task Force and the Energy Partnership for better integration of all security-related activities.

Sources:

UN and African Union launch joint task force on peace and security

<http://www.un.org/apps/news/story.asp?NewsID=36192&Cr=African+Union&Cr1=>

First High-Level Meeting of the Africa-EU Energy Partnership

<http://www.iisd.ca/ymb/energy/aeep/>

First High Level Meeting of the Africa-EU Energy Partnership

<http://www.aeep-conference.org/>

AfDB's Response to Climate Change in Africa

<http://www.afdb.org/en/news-events/article/afdb-response-to-climate-change-in-africa-7165/>

⁹ An Emerging Nordic-Baltic Alliance Might Have Security Implications

Military Implications:

Such new alliances could lead to new security arrangements and environment-related regulations; the military should begin to explore how to react and how the Army Strategy for the Environment could be applied. [See Arctic-related items in previous environmental security reports.]

Sources:

UK: Northern summit was not anti-European

<http://euobserver.com/19/31677>

Nordic Baltic Summit

<http://uknordicbaltic.readandcomment.com/>

Arctic NATO to watch the Russians

http://english.pravda.ru/world/europe/20-01-2011/116584-arctic_nato-0/

UK-Nordic-Baltic Summit to form new "alliance"
<http://www.baltictimes.com/news/articles/27816/>

¹⁰ **Pacific Region Programs for Addressing Environmental Security**

Military Implications:

Military and security entities in Asia should consider collaboration with these and similar organizations and ensure that their strategies are taken into account when addressing security issues in the region. Also, it is important to cooperate with the priorities set by the PREP Secretariat and the eventual new regulations that might result from the Strategic Plan.

Sources:

Pacific Environment Ministers' Communiqué

http://www.sprep.org/article/news_detail.asp?id=822

Focused Action: Priorities for Addressing Climate Change in Asia and the Pacific

<http://www.adb.org/documents/brochures/climate-change-priorities/default.asp>

¹¹ **Project on National Security Reform (PNSR) Vision Working Group Report**

Military Implications:

Military personnel with foresight responsibilities should review this report as to potential impacts on their organizations, budgets, opportunities, and effectiveness. They should also consider how to participate in shaping, establishing, and collaborating with such a center.

Sources:

Project on National Security Reform

<http://www.pnsr.org/index.asp>

Vision working group Report and Scenarios

http://pnsr.org/data/files/project_on_national_security_reform_vwg.pdf

¹² **Comprehensive Assessment of Environmental Security**

Military Implications:

The book might provide some new insights into environmental problems and how environmental diplomacy could prevent conflict.

Source:

Environmental Security. A Guide to the Issues

<http://www.greenwood.com/books/printFlyer.aspx?sku=A3197C>

INTERNATIONAL TREATIES RELATED TO ENVIRONMENTAL SECURITY AND MILITARY ACTIONS

¹⁴ Updates of the Rome Statute Include Amendments on the Crime of Aggression and Expansion of Criminalizing the Use of Certain Weapons in Non-international Conflicts

Military Implications:

Although the U.S. is not a State Party to the ICC, relevant military personnel should review these new amendments to be prepared to cooperate or comply, as required by status of forces agreements, in those countries that are States Party.

Sources:

Review Conference of the Rome Statute

<http://www.coalitionfortheicc.org/?mod=review>

States Parties Approve New Crimes for International Criminal Court. ASIL Volume 14, Issue 16

<http://www.asil.org/files/insight100622pdf.pdf>

¹⁵ UN Resolution Acknowledges Access to Clean Water and Sanitation a Human Right

Military Implications:

Military-to-military personnel concerned with water-related causes of conflict should be made aware of this resolution to add justification to their continued or expanded operations. Although the resolution is voluntary, it gives a new rationale to all organizations, including peacekeeping and other military entities, to increase their efforts towards improving the water situation in the regions where they are stationed or are operating. The resolution increases the likelihood that actions by public and private security actors will be scrutinized more often and more thoroughly for their impact on water, up to and possibly including provoking charges of "aggression".

Sources:

General Assembly Adopts Resolution Recognizing Access to Clean Water, Sanitation as Human Right, by Recorded Vote of 122 in Favor, None against, 41 Abstentions

<http://www.un.org/News/Press/docs/2010/ga10967.doc.htm>

General Assembly declares access to clean water and sanitation is a human right

<http://www.un.org/apps/news/story.asp?NewsID=35456&Cr=sanitation&Cr1>

¹⁶ UN Human Rights Council Affirms Right to Water as Legally-Binding

Military Implications:

Senior military personal should explore military roles in implementing this resolution to reduce water-related conflicts in the future. Military-to-military personnel concerned with water-related causes of conflict should be made aware of this resolution to add justification to their continued or expanded operations. Since the UN Human Rights Council resolution is binding, it gives a new rationale to all organizations, including peacekeeping and other military entities, to increase their efforts towards improving the water situation in the regions where they are stationed or are operating. The resolution increases the likelihood that actions by public and private security actors will be scrutinized more often and more thoroughly for their impact on water, up to and possibly including provoking charges of "aggression".

Sources:

UN united to make the right to water and sanitation legally binding

<http://www.ohchr.org/en/NewsEvents/Pages/DisplayNews.aspx?NewsID=10403&LangID=E>

15/... Human rights and access to safe drinking water and sanitation. Human Rights Council Resolution A/HRC/15/L.14 (Sept. 24, 2010)

<http://daccess-dds-ny.un.org/doc/UNDOC/LTD/G10/163/09/PDF/G1016309.pdf?OpenElement>

UN landmark decision: right to water and sanitation is legally binding

<http://internationallawobserver.eu/2010/10/14/un-landmark-decision-right-to-water-and-sanitation-is-legally-binding>

¹⁷ International Biosecurity Initiative

Military Implications:

Military and security personnel with biosecurity-related responsibilities should review this legislation, follow its legislative progress, and explore its implications with their international counterparts for reducing the full range of international biosecurity threats and improving the use of nanosensor and other networks (some of which have been referenced in these monthly reports).

Sources:

Bill: To improve the international strategy of the United States for monitoring, reducing, and responding to biological risks, and for other purposes.

<http://www.govtrack.us/congress/bill.xpd?bill=h111-6297>

Bill Would Establish Global Biosecurity Body

http://gsn.nti.org/gsn/nw_20101005_4535.php

H.R. 5498: WMD Prevention and Preparedness Act of 2010

<http://www.govtrack.us/congress/bill.xpd?bill=h111-5498>

¹⁸ Synthetic Biology Guidelines to Reduce Bioweapon Threats

Military Implications:

International military liaisons with security, health, and environmental responsibilities should be aware of these guidelines and share them with their counterparts to speed the day when international agreements are written to monitor and control synthetic biology.

Source:

Screening Framework Guidance for Providers of Synthetic Double-Stranded DNA

<http://www.phe.gov/Preparedness/legal/guidance/syndna/Documents/syndna-guidance.pdf>

¹⁹ High cancer rates in Fallujah, Iraq; New Study Raises Questions on Environmental Damage from Bombardments

Military Implications:

The results of this study will probably be added to similar preceding ones requiring further investigations on the potential implications of the use of certain weapons in urban environments. If the allegations prove justified, and depleted uranium is found to be the key cause, then it is fair to

speculate that pressure from civil society will increase for restricted use of these weapons; hence, increased research for substitutes would be wise. The same might be hypothesized for conventional munitions propellants and combustion residues.

Sources:

Toxic legacy of US assault on Fallujah 'worse than Hiroshima'

<http://www.independent.co.uk/news/world/middle-east/toxic-legacy-of-us-assault-on-fallujah-worse-than-hiroshima-2034065.html>

Cancer, Infant Mortality and Birth Sex-Ratio in Fallujah, Iraq 2005–2009

<http://www.scribd.com/doc/34158205/Cancer-Infant-Mortality-and-Birth-Sex-Ratio-in-Fallujah-Iraq-2005–2009>

²⁰ ***Measuring Progress in Conflict Environments: A Metrics Framework***

Military Implications:

The MPICE framework is a good resource for improving security activity in the field.

Source:

Measuring Progress in Conflict Environments

<http://www.usip.org/resources/measuring-progress-in-conflict-environments-mpice-0>

²¹ **Economic Argument for Peace-building in Sudan**

Military Implications:

AFRICOM and security personnel associated with Sudan should review this report and use its data as a case for ongoing conflict prevention and capacity-building programs.

Sources:

Return to conflict in Sudan could cost in excess of US\$100 billion

<http://www.frontier-economics.com/europe/en/news/1028/>

The cost of future conflict in Sudan

<http://www.frontier-economics.com/library/pdfs/frontier%20report%20-%20the%20cost%20of%20future%20conflict%20in%20sudan.pdf>

²² **Artillery Training Charges Pose Environmental Asbestos Threat**

Military Implications:

The military should investigate the potential use of such hazardous material in installations and increase safety measures. It is not clear at this point what the results of the investigation will be, but there might be some recommendations for standards' improvements and enforcements, as well as replacement of potentially hazardous materials in such items.

Source:

Artillery drills spark asbestos fears

<http://www.abc.net.au/news/stories/2010/06/29/2939489.htm?section=justin>

²³ **Latin American Initiatives for Environmental Security**

Military Implications:

As part of its actions for addressing security in the region, the military with responsibility in Latin American and the Caribbean (USSOUTHCOM) should (if not already doing so) explore improvements for cooperation with international, national, and regional organizations to help the success of the environmental conservation programs as part of the region's stability strategy.

Sources:

UNDP, Ecuador sign deal to protect Amazon from oil drill

<http://content.undp.org/go/newsroom/2010/july/PNUdyEcuadorsuscribenacuerdoparalainiciativaYasuni.en>

Working Towards Carbon Neutrality

<http://www.ipsnews.net/news.asp?idnews=52407>

US converts Brazilian debt into environmental protection

<http://news.malaysia.msn.com/business/article.aspx?cp-documentid=4269914>

UNDP LAC Regional Biodiversity Initiative Bulletin

<http://www.iisd.ca/larc/pdf/larc0107e.pdf>

²⁴ **First U.S.-Russian Environmental Protection Park**

Military Implications:

This joint venture represents an example of how environmental concerns could improve confidence building among nations. The opening of this park within a year should be used to identify and initiate similar environmental joint projects with other nations. Increasing land areas being set aside for conservation increases the likelihood that future security operations from natural disaster mitigation to conflicts could occur on these lands; hence, new Rules of Engagement would be needed for these situations.

Source:

A breakthrough in Beringia. Russia and the US are creating a giant international park in Chukotka and Alaska

http://rt.com/Top_News/Press/eng/2010-08-25/?fullstory

²⁵ **CEC's Five-year Strategic Plan Increases North-American Environmental Integration**

Military Implications:

Relevant military personnel should keep track of the CEC's work in view of potential new regulations or directives, as well as effects on collaboration among government agencies, that might affect some military operations and on collaboration among military counterparts.

Sources:

CEC Ministerial Statement. Seventeenth Regular Session of the CEC Council

<http://www.cec.org/Page.asp?PageID=122&ContentID=2968>

Government of Canada Releases Biomonitoring Data from the Canadian Health Measures Survey

http://www.hc-sc.gc.ca/ahc-asc/media/nr-cp/_2010/2010_139-eng.php

Monitoring Greenhouse Gases

<http://pubs.acs.org/cen/coverstory/88/8832cover.html>

²⁶ EU to Set Resource Efficiency Targets*Military Implications:*

The military and its contractors stationed in the EU should be prepared to adapt, as legally appropriate, to the new regulations, as it is not clear at this point if there will be exemptions for the military.

Source:

EU moots link between resource efficiency and budgetary targets

<http://euobserver.com/9/31704/?rk=1>

²⁷ Islamic Conference of Environmental Ministers Approves Detailed Program*Military Implications:*

The Islamic environmental program should be reviewed by military and related security personnel with environmental security responsibilities in Islamic nations. Opportunities should be explored to cooperate with programs to increase Islamic nations' participation in the fields of environmental science, sustainable environmental technologies, and environmental security strategies.

Sources:

4th Islamic Conference of Environment Ministers Starts in Tunis

<http://www.thepeninsulagatar.com/latest-news/128323-4th-islamic-conference-of-environment-ministers-starts-in-tunis-.html>

4th Islamic Conference of Environment Ministers and Conference documents

<http://www.sesric.org/event-detail.php?id=432>

²⁸ Evolution of Environmental Management Philosophy in China*Military Implications:*

The paper should be reviewed for its insights into environmental management activities in the PRC in preparation for any environmental security cooperation between the US and China.

Source:

The Evolution of Environmental Management Philosophy Under Rapid Economic Development in China (only preview available; purchase or subscription required for full text)

<http://www.springerlink.com/content/7215678t41281v40/>

TECHNOLOGICAL BREAKTHROUGHS WITH ENVIRONMENTAL SECURITY IMPLICATIONS**³⁰ Nanowire Semiconductors for Nano-sensors and Nano-robotics***Military Implications:*

The military should follow this development for its potential applicability to hazardous material detection in a variety of situations. Security organizations should also prepare for criminal and

terrorist opportunities offered by self-powered and autonomous systems. Scenarios should be written to explore who will be able to control – or deactivate - such systems in strategic, unstable, developing countries where two or more ‘sides’ might want to exploit such devices.

Sources:

Push-Button Logic on the Nanoscale

<http://www.physorg.com/news200213686.html>

Strain-Gated Piezotronic Logic Nanodevices

<http://onlinelibrary.wiley.com/doi/10.1002/adma.201001925/abstract;jsessionid=3A96C84BCE895C3E76C39F13052E26FA.d02t01>

³¹ **New Super-efficient Undersea Marine Research Robot**

Military Implications:

This new technology should be investigated for its ocean research and environmental monitoring capabilities.

Source:

New long-range undersea robot goes the distance

http://www.mbari.org/news/news_releases/2010/lrauv/lrauv-release.html

³² **Cost-Effective Real-Time Electronic Monitoring for Coastal Ecosystems**

Military Implications:

This new technology should be investigated for its potential in environmental cleanup of coastal military damage and environmental monitoring capabilities.

Source:

Researchers Developing Real-Time Electronic Monitoring For Coastal Waters

<http://news.ncsu.edu/releases/wmsdeanbaysensors/>

New Detection and Cleanup Techniques

³⁴ **Novel Micro-enabling Technology Potentials to Improve Detection Efficiency**

Military Implications:

Military and security personnel concerned with cellular and molecular detection, computation, and analysis should consider the techniques and/or contacting the company for possible partnership, for improving detection systems.

Sources:

Miniature droplet technology receives Royal Society Enterprise Fund backing

<http://royalsociety.org/news/miniature-droplet-technology/>

Sphere Fluidics

<http://www.spherefluidics.eu/>

³⁵ DNA Backbone Provides Foundation for Sensitive New Multi-material Sensor*Military Implications:*

This technique should be evaluated for simple and inexpensive environmental sensing. Security organizations should evaluate this technology in the search for innovative combinations of new and of new-old sensing systems to anticipate future missions, as well as responding to current threats.

Sources:

DNA puts Stanford chemists on scent of better artificial nose

<http://news.stanford.edu/news/2010/august/newnose-082310.html>

Polyfluorophores on a DNA Backbone: Sensors of Small Molecules in the Vapor Phase

<http://onlinelibrary.wiley.com/doi/10.1002/anie.201002701/abstract>

³⁶ U.S.-China Ozone Microbubbles Provide Widely Applicable Cleanup Technique*Military Implications:*

If the trials of this technology are successful, it should prove useful in pollution situations where the water contaminants and occurrence are appropriate.

Source:

Utah Microbubbles Clean Dirty Soil in China

<http://www.unews.utah.edu/p/?r=101110-1>

³⁷ Laser Detector Offers Fast Gas Analysis*Military Implications:*

This technology should be reviewed for its ability to improve environmental assessments and other security applications.

Source:

JILA unveils improved 'molecular fingerprinting' for trace gas detection

<http://www.physorg.com/news/2010-10-jila-unveils-molecular-fingerprinting-gas.html>

³⁸ New Colorimetric Sensor Uniquely Detects Vapor from TATP Explosive*Military Implications:*

This device should be evaluated as a potentially valuable addition to the current set of environmental surveillance tools.

Sources:

Sniffing out shoe bombs: A new and simple sensor for explosive chemicals

<http://www.nanowerk.com/news/newsid=18571.php>

A Colorimetric Sensor Array for Detection of Triacetone Triperoxide Vapor

<http://pubs.acs.org/doi/abs/10.1021/ja107419t>

³⁹ Spectrometer Provides Accurate Beta/Gamma Detection in 15 Minutes

Military Implications:

These detectors should be reviewed for their utility in cleaning up radiation-contaminated environmental sites.

Source:

New technology to speed cleanup of nuclear contaminated sites

<http://www.physorg.com/news/2010-12-technology-cleanup-nuclear-contaminated-sites.html>

⁴⁰ Molecular Imprinted Polymers Provide Basis for Sensors of Multiple Compounds

Military Implications:

This research should be followed for its potential use in stationary and portable detection devices.

Sources:

Sensors to detect explosives, monitor food

<http://www.nanowerk.com/news/newsid=19807.php>

Electropolymerized Molecularly Imprinted Polymer Films of a Bis-Terthiophene Dendron: Folic Acid Quartz Crystal Microbalance Sensing

<http://pubs.acs.org/doi/abs/10.1021/am100805y>

⁴¹ Russian Enterprise to Mass Produce Low Cost Detectors for More than 40 Substances

Military Implications:

This product should be evaluated against current options for environmental sensors.

Source:

RUSNANO Funds Project for Detectors of Explosives and Narcotics

<http://www.nanowerk.com/news/newsid=19545.php>

⁴² Flexible Supercapacitor Could Power Wearable Environmental Sensors

Military Implications:

This development should be explored to reduce weight on the soldier and improve mobile environmental sensor capabilities.

Source:

T-Shirt replaces battery: Fiber-based electrochemical micro-supercapacitor

<http://www.physorg.com/news/2011-01-t-shirt-battery-fiber-based-electrochemical-micro-supercapacitor.html>

⁴³ Marine Bacteria Which Can Metabolize Steel Discovered

Military Implications:

Relevant military personnel should investigate to determine if this biological solution for iron conversion could help address underwater ship and unexploded ordnance cleanup.

Source:

Steel-munching bacteria are devouring the Titanic, say scientists

<http://www.guardian.co.uk/science/2010/dec/06/titanic-steel-bacteria-rusticles-pipelines>

⁴⁴ Improved Method to Remove Pollutants from Gas and Liquids

Military Implications:

The military should evaluate this technique for environmental cleanup of contaminated water or improvements in emissions from combustion sources.

Source:

New method for making tiny catalysts holds promise for air quality

http://www.news.illinois.edu/news/10/1215carbon_spheres_rood.html

⁴⁵ Nano-based Olfactory Sensor Offers Diversity, Extreme Miniaturization

Military Implications:

These devices offer the possibility of very small and inexpensive environmental sensing systems; their further development should be closely monitored.

Sources:

Single-Nanobelt Electronic Nose: Engineering and Tests of the Simplest Analytical Element

<http://pubs.acs.org/doi/abs/10.1021/nn100435h>

‘Smart’ sand: grain-sized nanotechnology electronic noses are on the horizon

<http://www.nanowerk.com/spotlight/spotid=17373.php>

⁴⁶ New Index Aids Characterization of Biological Reaction to Nanomaterials

Military Implications:

This method should be assessed for possible use in nanomaterial risk assessment.

Sources:

An index for characterization of nanomaterials in biological systems. Nature Nanotechnology, 15 August 2010 | doi:10.1038/nnano.2010.164

<http://www.nature.com/nnano/journal/vaop/ncurrent/abs/nnano.2010.164.html>

Predicting how nanoparticles will react in the human body

<http://www.physorg.com/news201094921.html>

⁴⁷ Autonomous Network of Sea Skimmers Could Speed Oil Spill Cleanup

Military Implications:

This is a promising development to add to the set of tools for remediating oceanic oil spills. It should be assessed for utility in diverse real-world conditions.

Source:

MIT uses nanotechnology to build autonomous oil-absorbing robot

<http://www.nanowerk.com/news/newsid=17787.php>

⁴⁸ New Technique Provides Simple, Sensitive Analysis of Aerosols*Military Implications:*

This improved technology should significantly simplify the task of identifying and controlling aerosol contaminants in the atmospheric environment. The technique should be evaluated by materiel developers, preventive health entities, and environmental managers for adaptation to identifying and quantifying chemical/biological war agents and environmental pollutants.

Sources:

Molecular Characterization of Organic Aerosols Using Nanospray-Desorption/Electrospray Ionization-Mass Spectrometry

<http://pubs.acs.org/doi/abs/10.1021/ac101449p>

New technique provides sensitive analysis of atmospheric particles

<http://www.nanowerk.com/news/newsid=18004.php>

⁴⁹ Photocatalytic Pavement Removes Nitrogen Oxides from City Air*Military Implications:*

This material should be evaluated for potential use in military construction to help contribute to improving air quality. A downside is addition of nitrate nutrient to surface water runoff into rivers. Any evaluation of this and other nanoproducts, especially those to be openly exposed to becoming air or waterborne, must take into account nanomaterials' possible negative health and environmental concerns under study, as reported in this and prior environmental security reports.

Source:

Nanoparticle-coated pavement that cleans the air

<http://www.nanowerk.com/news/newsid=17444.php>

⁵⁰ New Water Testing and Purification Technologies**⁵¹ January 2011***Military Implications:*

These developments should be evaluated for their usefulness in areas with contaminated water and for managing hydrocarbon spills.

Sources:

Special Sugar, Nanoparticles Combine to Detect Cholera Toxin

<http://news.ucf.edu/UCFnews/index?page=article&id=00240041052a2b5bb012d4490764900622f>

Identification of Molecular-Mimicry-Based Ligands for Cholera Diagnostics using Magnetic Relaxation

<http://pubs.acs.org/doi/abs/10.1021/bc100442q>

NSF Webcast: Water and Oil Everywhere, and Now it's Safe to Drink

http://www.nsf.gov/news/news_summ.jsp?cntn_id=118400&WT.mc_id=USNSF_51&WT.mc_e v=click

⁵² August 2010

Military Implications:

These developments should be followed as potential contributions to the set of water treatment methods available for mainly remote regions. New water technologies in combination with the increasing view that water is a human right, mean that security actors need to consider water as a key issue in any operations, especially ones outside the national borders of operation participants.

Sources:

SU scientists develop a high-tech ‘tea bag’ filter for cleaner water

<http://blogs.sun.ac.za/news/2010/07/28/su-scientists-develop-a-high-tech-%E2%80%99tea-bag%E2%80%99-filter-for-cleaner-water/>

High Speed Water Sterilization Using One-Dimensional Nanostructures

<http://dx.doi.org/doi:10.1021/nl101944e>

Nanotechnology for water purification. International Journal of Nuclear Desalination 2010 - Vol. 4, No.1 pp. 49 – 57 (abstract)

http://www.inderscience.com/search/index.php?action=record&rec_id=33766&prevQuery=&ps=10&m=or

⁵³ **Electrified Nanotube-Fabric Filter Offers Cheap, Fast Water Purification**

Military Implications:

This water purification technology should be tested for field applications.

Sources:

High-speed filter uses electrified nanostructures to purify water at low cost

<http://www.rdmag.com/News/2010/08/Materials-Nanotechnology-High-speed-filter-uses-electrified-nanostructures-to-purify-water-at-low-cost/>

High Speed Water Sterilization Using One-Dimensional Nanostructures (Abstract)

<http://pubs.acs.org/doi/abs/10.1021/nl101944e>

⁵⁴ **Graphene-based Composite Removes Arsenic from Drinking Water**

Military Implications:

The new material should be evaluated for its applicability in systems for purifying arsenic-contaminated water sources.

Sources:

Graphene soaks up arsenic

<http://physicsworld.com/cws/article/news/43162>

Water-Dispersible Magnetite-Reduced Graphene Oxide Composites for Arsenic Removal

<http://pubs.acs.org/doi/abs/10.1021/nn1008897>

⁵⁵ New Catalyst Enables Water Decontamination by Visible Light*Military Implications:*

This new technique should be further evaluated for its bactericidal effectiveness (e.g. E. coli needs to be reduced to zero) and economic feasibility (palladium is expensive).

Sources:

Nanoparticles and light can purify water

<http://www.scidev.net/en/news/nanoparticles-and-light-can-purify-water.html>

Memory antibacterial effect from photoelectron transfer between nanoparticles and visible light photocatalyst

<http://www.rsc.org/publishing/journals/JM/article.asp?doi=b917239d>

⁵⁶ Adding Flocculation Agents to Runoff Filter Socks Improves Performance*Military Implications:*

This modification should be evaluated for possible use in reducing environmental damage on installations and at construction projects.

Source:

'Super socks' help stem pollution runoff

<http://www.physorg.com/news199099635.html>

⁵⁷ Portable Virus Detector Could Check Pandemics*Military Implications:*

Relevant military and security personnel should explore the use of this technology to see if, indeed, it is better than current systems.

Sources:

Sensors: A portable device for virus detection

<http://www.nanowerk.com/news/newsid=18701.php>

Rapid detection of viral RNA by a pocket-size real-time PCR system (by subscription only)

<http://pubs.rsc.org/en/Content/ArticleLanding/2010/LC/c004921b>

⁵⁸ More Reliable "Kill Switch" Found for Genetically Engineered Microbes*Military Implications:*

This technique should be explored for controlling genetically modified organisms, including biological threats, both intended and accidental. Security organizations should create joint training programs to practice working together with the switch in a variety of security threat situations.

Source:

A 'Kill Switch' for Rogue Microbes

<http://www.technologyreview.com/biomedicine/26094>

59 Potential Bioweapon Countermeasure against Ebola and Marburg Virus

Military Implications:

If not already underway, relevant military personnel should contact the scientists to expedite this research for its potential in bio-war countermeasures.

Source:

Small Molecules May Prevent Ebola Infection

<http://tiger.uic.edu/htbin/cgiwrap/bin/newsbureau/cgi-bin/index.cgi?from=Releases&to=Release&id=3111&start=1287856211&end=1295632211&topic=0&dept=0>

Promising Environmental-friendly Technologies

61 Nanoimprint May Create Synthetic, Chemical-Free, Anti-Bacterial Surfaces

Military Implications:

This technology should be followed, as it may provide a means for reducing the environmental impact of naturally or deliberately introduced contaminants.

Sources:

Singapore consortium learns from nature to produce new chemical-free, anti-bacteria plastic 'skins'

<http://www.nanowerk.com/news/newsid=19556.php>

I.C.O.N. Project #2 : Towards Anti-Bacterial Surfaces

<http://www.imre.a-star.edu.sg/nil/project2.pdf>

62 Optical Link Facilitates Exploration of the Underwater Environment

Military Implications:

The military should keep in touch with this development for gathering environmental data on the underwater environment, such as scanning for unexploded ordnance or other hazardous materials.

Source:

Revolutionary Communications System Promises New Generation of Untethered, Undersea Vehicles

<http://www.physorg.com/news197133272.html>

63 Advances in Wireless Location Detection

Military Implications:

The military should follow this research for its future applicability to device and personnel tracking within field and office milieus. Security organizations should also assess what these advances may mean in terms of the additional readiness and ability of terrorists/extremists to threaten disruption and/or violence.

Source:

Can you find me now?

<http://web.mit.edu/newsoffice/2010/location-sensing-0909.html>

⁶⁴ Charged Particle Generators Produce Desert “Rainstorms”

Military Implications:

Global warming models predict that those areas with low rainfall will get less rain in the future. This could increase environmental migration, which can lead to conflicts in the receiving areas. This technology should be explored for its future potential to reduce such potential conflicts.

Source:

Technology created 50 rainstorms in Abu Dhabi's Al Ain region last year

<http://www.dailymail.co.uk/sciencetech/article-1343470/Have-scientists-discovered-create-downpours-desert.html>

⁶⁵ Metal-Organic Frameworks (MOFs) Give Greatly Improved CO₂ Storage

Military Implications:

DARPA should explore this capacity – if not already doing so – for carbon capture and storage to reduce the military carbon footprint.

Sources:

World records by UCLA chemists, Korean colleagues enhance ability to capture CO₂

<http://newsroom.ucla.edu/portal/ucla/world-records-by-ucla-chemists-163439.aspx>

Ultra-High Porosity in Metal-Organic Frameworks

<http://www.sciencemag.org/cgi/content/abstract/science.1192160v1>

⁶⁶ Carbonates for Construction Drawn from Carbon Dioxide

Military Implications:

The military should follow this work for potential application to CO₂ reduction programs, water desalination plans, and construction projects. Any evaluation must consider how the metal ions required to produce insoluble carbonates are to be obtained without creating new environmental hazards.

Source:

Putting carbon dioxide to good use

<http://web.mit.edu/newsoffice/2010/belcher-carbon-0922.html>

⁶⁷ Improved Plastic Recycling

Military Implications:

If the process proves to be cost-effective with acceptable environmental impacts, then it could represent a substantial contribution to recycling in military installations and operations.

Source:

Researchers: New tech could recycle all household plastics

<http://www.smartplanet.com/people/blog/pure-genius/new-tech-could-recycle-100-percent-of-household-plastics-even-holiday-wrap/5195/>

⁶⁸ New Cement Process Greatly Reduces Energy Load and CO₂ Emission

Military Implications

This process should reduce military construction's CO₂ emissions footprint and energy usage, but Celitement is not yet economically competitive with traditional manufacturing methods. DARPA or related research systems might explore cost reduction procedures.

Sources:

New Chemistry, Less Energy Could Yield Greener Cement

<http://news.nationalgeographic.com/news/energy/2010/12/101209-green-cement-energy-greenhouse-gas/>

Celitement GmbH

<http://www.celitement.com/en/>

⁶⁹ Sustainable Method to Recycle Rubble into Durable Construction Material

Military Implications:

Military personnel working in post-disaster environments with rubble debris crises should contact the researchers to find out how they can participate in researching and launching this recycling method in disaster locations.

Sources:

Researchers Find Method for Recycling Rubble, Rebuilding Haiti

<http://www.gatech.edu/newsroom/release.html?nid=63746>

The American Ceramic Society Jan-Feb 2011 Bulletin

<http://ceramics.org/publications-and-resources/the-bulletin/>

Breaking Haiti's the reconstruction logjam: Progress through rubble reuse

http://americanceramicsociety.org/bulletin/2011_pdf_files/jan_feb_11/#/22/

⁷⁰ New Forms of Air Conditioning Assuming Larger Role

Military Implications:

Centers such as the Western Cooling Efficiency Center at the University of California at Davis and the National Renewable Energy Laboratory should be consulted and their work monitored so that plans for outfitting new or remodeled buildings can take these important trends and innovations into account.

Source:

Seeking to Cool Air Conditioning Costs

<http://news.nationalgeographic.com/news/2010/08/100812-energy-evaporative-air-conditioner/>

Air conditioning: Cold comfort

<http://www.independent.co.uk/environment/air-conditioning-cold-comfort-2041647.html>

⁷¹ New Insights into Photosynthesis Could Change Energy Storage and Transmission

Military Implications:

This research offers key insights into harvesting nature's most abundant renewable energy source and should be followed to reduce oil-dependency and lessen the military environmental footprint.

Source:

Fine-tuning photosynthesis

<http://web.mit.edu/newsoffice/2010/fine-tuning-photosynthesis.html>

⁷² Adding Graphene to Lithium-Ion Batteries Dramatically Reduces Recharge Time

Military Implications:

This technology could greatly improve the operational performance of portable/mobile environmental sensing systems, hybrid and electric vehicles, and other energy storage applications and should be monitored as it proceeds to commercial availability.

Source:

Battery research could lead to shorter recharge time for cell phones

<http://www.physorg.com/news198309365.html>

⁷³ Carbon Nanotube Cathodes, Silicon Anodes Improve Battery Performance

Military Implications:

The evolution of these technologies should be tracked by those responsible for reducing the military environmental footprint, meeting new energy standards, and improving power supply performance.

Sources:

Contour Energy Systems Signs Exclusive Technology Licensing Agreement with MIT

<http://www.contourenegy.com/newsmodule/view/id/13/src/@random4c7d17e3c79cc/>

Monster power. Lithium-ion batteries start to take on the big stuff

<http://www.economist.com/node/17352944?fsrc=nwl>

Silicon strategy shows promise for batteries

<http://www.nanowerk.com/news/newsid=18492.php>

⁷⁴ New Solar-Powered Process Converts Atmospheric CO₂ to Solid Carbon

Military Implications:

This development, if successfully scaled up, could be a significant addition to the set of CO₂-mitigation tools.

Sources:

New solar-powered process removes CO₂ from the air and stores it as solid carbon

<http://www.nanowerk.com/spotlight/spotid=17198.php>

A New Solar Carbon Capture Process: Solar Thermal Electrochemical Photo (STEP) Carbon Capture

<http://pubs.acs.org/doi/abs/10.1021/jz100829s>

⁷⁵ Solar Energy Conversion System Uses Both Photovoltaic and Thermal Technologies

Military Implications:

This technology could provide a major increase in the overall efficiency of solar power systems, and should be closely followed for full exploitation as available. Such a system should reduce logistical requirements and could be left behind to help post-conflict local recovery.

Source:

New solar energy conversion process could revamp solar power production

<http://www.nanowerk.com/news/newsid=17454.php>

⁷⁶ New Supercapacitor Design Claims Large Improvements in Energy Storage

Military Implications:

When brought to a commercialized level, these devices could provide significant improvements in power supply performance in environmental equipment. Their further development should be followed.

Sources:

Ultrahigh-power micrometre-sized supercapacitors based on onion-like carbon. Nature Nanotechnology Newsletter (2010) DOI:10.1038/nnano.2010.162

<http://www.nature.com/nnano/journal/vaop/ncurrent/abs/nnano.2010.162.html>

International research team develops ultrahigh-power energy storage devices

<http://www.physorg.com/news201272263.html>

⁷⁷ New Window Developments Aim at Saving, Generating Energy

Military Implications:

These developments, if/when they reach a level of practical applicability, could make a definite contribution to reducing the environmental footprint of installation buildings and/or provide power to remote or mobile devices. Their progress should be monitored.

Sources:

Making Smart Windows that Are Also Cheap

<http://www.technologyreview.com/energy/25989/page1/>

Soladigm Company

<http://soladigm.com/index.html>

New technique announced to turn windows into power generators

<http://www2.le.ac.uk/ebulletin/news/press-releases/2010-2019/2010/08/nparticle.2010-08-10.1427638716>

EnSol Company

<http://www.ensol.no/index.htm>

⁷⁸ NSF Makes 14 Grants in Renewable Energy and Sustainability

Military Implications:

Organizations in the environmental security community should establish contact with the awardees to exploit their accomplishments as quickly as practicable.

Source:

Exploring Sustainability for Energy and Buildings

http://www.nsf.gov/news/news_summ.jsp?cntn_id=117731&WT.mc_id=USNSF_51&WT.mc_e v=click

Technologies for New Generations of Cars

⁸⁰ Experts Say Possible Rare Earth Shortages Not A Real Problem for Electric Cars

Military Implications:

Relevant military personnel should investigate the pros and cons of the SRM to reduce dependency on rare earth elements for electric vehicles.

Source:

Millennium Project “global-energy” listserve discussion; see this specific post in the Appendix List Archives: <http://mp.cim3.net/forum/global-energy/>

⁸¹ NASA’s SERVIR Environmental Imaging-Decision Support System Extended from Mesoamerica and Africa to Asia

Military Implications:

Military and security personnel with environmental responsibilities in Central and South Asia should become familiar with this new environmental planning and management tool. If not already accomplished, AFRICOM should explore the use of SERVIR by African countries in their environmental security planning and training.

Source:

SERVIR: Program brings satellite imagery, decision support tools to Himalayan region
<http://www.physorg.com/news205578190.html>

Technologies that Could Trigger New Forms of Arms Race

⁸³ Robot Planes for Environmental Monitoring and Warfare Raise Legal Concerns

Military Implications:

Development of unmanned aircraft for environmental monitoring and warfare should consider built-in systems that would assure the respect of basic regulations such as those included in the Geneva Convention, for avoiding human victims and environmental damages. With the

proliferation of UAV's, special attention should be given to preventing their misuse by non-state actors.

Sources:

Satellite navigation steers unmanned micro-planes

http://www.esa.int/esaCP/SEMMUZDODDG_index_0.html

The solar-powered spy plane that will be able to fly non-stop for FIVE years

<http://www.dailymail.co.uk/sciencetech/article-1313552/The-solar-powered-spy-plane-able-fly-non-stop-FIVE-years.html>

Vegas Drone Trial Makes History

<http://www.justicewithpeace.org/node/1763>

The law versus justice. Vegas anti-drone trial makes history

http://www.lasvegascitylife.com/articles/2010/09/23/news/local_news/iq_38222529.txt

B. Preventing or Responding to Environmentally Caused Conflicts

SECURITY IMPLICATIONS OF ENVIRONMENTAL ASPECTS

⁸⁶ New Website Addresses Conflict-sensitive Conservation

Military Implications:

Military personnel with environmental and land use planning responsibilities should explore this website for applications in planning.

Sources:

Conflict-Sensitive Conservation. MEA Bulletin Issue No. 97, Thursday, 29 July 2010

<http://www.iisd.ca/mea-l/meabulletin97.pdf>

Conflict-Sensitive Conservation website

<http://www.csconservation.org/>

⁸⁷ Extinction Threatening 21% of Africa's Freshwater Species Could Have Security Implications

Military Implications:

Military personnel with African environment and water responsibilities should review this IUCN assessment for their region to help plan and implement sustainable projects that do not disrupt local food and material supplies. Since there are procedures for protecting some land animal and ocean fishing zones, procedures for protecting inland fish stocks should be considered.

Source:

African fresh water species threatened – livelihoods at stake

<http://www.iucn.org/knowledge/news/?5898/African-freshwater-species-threatened---livelihoods-at-stake>

⁸⁸ Possible Conflicts over National/Regional Geoengineering Projects

Military Implications:

Environmental security personnel should be on the alert for news of any geoengineering projects, and consider possible responses. Geoengineering could have potentially massively disruptive, if not destructive, unintended consequences. Therefore, every security organization should be at least aware of and considering response options to all geoengineering proposals that might be proposed by any parties. Geoengineering could be deliberately weaponized against specific targets and spill over to unintended victims.

Sources:

Regional climate response to solar-radiation management

<http://www.nature.com/ngeo/journal/v3/n8/full/ngeo915.html>

'Cheap' solar geoengineering plans may have unintended consequences

http://www.theecologist.org/News/news_round_up/562566/cheap_solar_geoengineering_plans_may_have_unintended_consequences.html

Efficacy of geoengineering to limit 21st century sea-level rise

<http://www.pnas.org/content/early/2010/08/20/1008153107>

Geoengineering won't curb sea-level rise

<http://www.nature.com/news/2010/100823/full/news.2010.426.html#B1>

⁸⁹ Indigenous People Demanding Regulations for Addressing Climate Change and Mining

Military Implications:

Those involved in military-to-military operations on lands of indigenous peoples should review the Lima Declaration for implications for future operations.

Sources:

Indigenous Peoples in Latin America Unite Against Mining

<http://www.galdu.org/web/index.php?odas=4967&giella1=eng>

Lima Declaration - Forum of Indigenous Peoples Mining, Climate Change And Well Being

<http://www.culturalsurvival.org/news/peru/lima-declaration-forum-indigenous-peoples-mining-climate-change-and-well-being>

RACE FOR NATURAL RESOURCES

⁹¹ Natural Resources Fuel Violence in Eastern D.R. Congo

Military Implications:

AFRICOM should cite this situation to policymakers in the region to encourage implementation of military-to-military programs to address environmental degradation that could trigger security issues. Similar actions should be taken in collaborations with peacekeeping forces. Since the factors that lead to these conflicts are increasing, it would be wise to create a collective intelligence system to identify and assess better approaches with and for all relevant stakeholders in the region.

Sources:

Rising Global Interest in Farmland: Can It Yield Sustainable and Equitable Benefits?

http://siteresources.worldbank.org/INTARD/Resources/ESW_Sept7_final_final.pdf

MONUSCO Mandate

<http://www.un.org/en/peacekeeping/missions/monusco/mandate.shtml>

UN has failed Congo mass rape victims, says investigator

<http://www.guardian.co.uk/world/2010/sep/08/congo-mass-rape-500-khare>

DR Congo: UN mission chief concerned over violence in troubled North Kivu

http://www.isria.com/RESTRICTED/D/2010/SEPTEMBER_24/23_September_2010_62.php

⁹² Protests in Peru over Dam Irrigation and Hydroelectric Project Part of a Regional Picture

Military Implications:

Southern Command's Public Private Cooperation program should reach out to the concession holders and Peruvian government to encourage a long-term partnership that honors the rights of local citizens. This could include education and training in relevant civil-military issues so that, if and when called upon, they can be effective immediately.

Sources:

Have the climate wars begun?

<http://www.guardian.co.uk/global-development/poverty-matters/2010/sep/21/climate-wars-machu-picchu-irrigation>

Cusco joins Espinar strike against Majes-Siguas project

<http://www.livinginperu.com/news-13201-outside-of-lima-peru-cusco-joins-espinar-strike-against-majes-siguas-project>

⁹³ The Battle for Rare Earth Elements Continues

Military Implications:

[Similar to previous on this issue] Accelerated R&D for substitutes should be encouraged. One can reasonably ask whether the Chinese actions are a market aggression test to determine how far they can press their rare earth mineral resource advantages.

Sources:

China Seizes Rare Earth Mine Areas

<http://www.nytimes.com/2011/01/21/business/global/21rare.html>

Rare Earth Metals Leave Toxic Trail to Toyota, Vestas

<http://www.businessweek.com/news/2011-01-06/rare-earth-metals-leave-toxic-trail-to-toyota-vestas.html>

Japan deep-sea robots to seek minerals: report

<http://www.physorg.com/news/2011-01-japan-deep-sea-robots-minerals.html>

⁹⁴ Chinese Rare Earth Restrictions*Military Implications:*

Even though new sources for rare earths look promising, it would be wise to continue R&D for substitutes. One can reasonably ask whether the Chinese action is a market aggression test to determine how far they can press their rare earth mineral resource advantages.

Sources:

Rare earths. Digging in. China restricts exports of some obscure but important commodities

<http://economist.com/node/16944034>

The Application of Rare Earth Metals is Widening Despite Lack of Engineering Data

<http://www.docstoc.com/docs/5379510/rare-earth-elements>

New Deposits of Rare Earths Ores in Tanzania Substitute for China?

<http://agmetalmminer.com/2010/04/08/new-deposits-of-rare-earths-ores-in-tanzania-substitute-for-china/>

⁹⁵ China Applies for Seabed Mining Permit in Search for New Mineral Resources*Military Implications:*

New regulations for these minerals and their exploitation are likely. Increased attention should be given to R&D for substitutions for these rare earths to reduce future likelihood for tensions over their access.

Sources:

Rush On for 'Rare Earths' as U.S. Firms Seek to Counter Chinese Monopoly

<http://www.nytimes.com/gwire/2010/07/23/23greenwire-rush-on-for-rare-earths-as-us-firms-look-to-co-58814.html>

Deep-sea mining adds to fears of marine pollution

<http://www.independent.co.uk/environment/nature/deepsea-mining-adds-to-fears-of-marine-pollution-2016292.html>

⁹⁶ China to Build Support Base for Seabed Exploration*Military and Related Security Implications:*

Rising interest in exploitation of deep sea resources triggers new types of environmental and security concerns. While deep-sea mining is an old concept, development of technologies and economics of resource shortage now raise this to the level of an emerging national security issue worthy of study. New regulations for deep-sea activities are likely. This is an opportunity to promote collective security, sharing of future benefits, and creating an international response system for deep-sea operations, as well as a topic of resource security.

Source:

China builds base to tap deep-sea energy: state media

<http://www.physorg.com/news202104598.html>

⁹⁷ Arctic and South China Sea Resource Issues Causing U.S. to Review Law of the Sea*Military Implications:*

It is likely that the debates concerning rights to resources in the South China Sea, polar regions, and other maritime areas will increase rapidly. This opens the potential for new military roles in those regions to ensure the safety of individuals and ecosystems. While the U.S. is “prioritizing” the Law of the Seas ratification, relevant military and security personnel should increase cooperation with international counterparts to develop policies to reduce and/or manage tensions in these potential resources-conflict areas.

Sources:

Joint Statement of the 2ND U.S.- ASEAN Leaders Meeting

<http://www.whitehouse.gov/the-press-office/2010/09/24/joint-statement-2nd-us-asean-leaders-meeting>

Remarks by Secretary Gates at ASEAN Defense Ministers Meeting Plus

<http://www.defense.gov/transcripts/transcript.aspx?transcriptid=4700>

Secretary Clinton: Remarks on Innovation and American Leadership to the Commonwealth Club

<http://www.state.gov/secretary/rm/2010/10/149542.htm>

Arctic Debate*Military Implications:*

[Same as others on related issues] The military should identify all its resources and programs for reducing GHGs and responding to effects of climate change, update information continuously, forecast how it might be called upon for both mitigation and adaptation, and perform a gap analysis in anticipation of future requests. International discourse over climate change is increasing the development of international policies and strategies to mitigate and adapt to climate change.

*Sources:***⁹⁹ September 2010**

Putin identifies Russia’s priorities in Arctic

<http://www.itar-tass.com/eng/level2.html?NewsID=15522974&PageNum=0>

Russia to draw up new Arctic atlas

<http://en.rian.ru/science/20100922/160679591.html>

The Arctic: Territory of Dialogue

<http://www.arctic.ru/>

Northeast Passage and Maritime Security

<http://blog.usni.org/2010/09/03/northeast-passage-and-maritime-security/>

Ninth Conference of Parliamentarians of the Arctic Region, European Parliament, Brussels, 13-15 September 2010. CONFERENCE STATEMENT

<http://www.europarl.europa.eu/arcticparl/Conference%20statement,%20Final%20draft%20as%20adopted.pdf>

9th Conference of Arctic Parliamentarians, European Parliament, Brussels, Belgium

<http://www.europarl.europa.eu/arcticparl/>

¹⁰⁰ Literature Addressing Arctic Security*Military Implications:*

Military and security personnel associated with the Arctic should review these reports for conflict prevention and support to police implications.

Sources:

Global action needed to conserve Arctic biodiversity

<http://www.unep.org/Documents/Multilingual/Default.asp?DocumentID=649&ArticleID=6800&l=en&t=long>

Protecting Arctic Biodiversity: Limitations and strengths of environmental agreements

<http://www.grida.no/publications/arctic-biodiversity/>

The Arctic Sea Competition and Key Strategic Challenges for Europe (Part One)

<http://www.sldinfo.com/?p=11635>

Arctic terror threats real: security agencies

<http://www.cbc.ca/canada/north/story/2010/11/10/cp-arctic-security-threats.html>

Climate change a top fear in North: report

<http://www.cbc.ca/canada/north/story/2010/11/16/arctic-security-conference-board.html>

NATURAL DISASTERS AND SCIENTIFIC EVIDENCE

Scientific Evidence and Potential Consequences

Military Implications:

[Same as other on similar issues] The military should identify all resources and programs for reducing GHGs and responding to effects of climate change, update information continuously, forecast how it might be called upon for both mitigation and adaptation, and perform a gap analysis in anticipation of future requests. International discourse over climate change is increasing the development of international policies and strategies to mitigate and adapt to climate change.

*Sources (listed by month):*¹⁰³ **January 2011**

It's Official: 2010 in a Statistical Tie for Warmest Year On Record

<http://www.climatecentral.org/news/its-official-2010-in-a-statistical-tie-for-warmest-year-on-record/>

2010 equals record for world's warmest year

http://www.wmo.int/pages/mediacentre/press_releases/pr_906_en.html

Killer year caps deadly decade - reducing disaster impact is "critical" says top UN disaster official

<http://www.unisdr.org/news/v.php?id=17613>

Overall picture of natural catastrophes in 2010 – Very severe earthquakes and many severe weather events

http://www.munichre.com/en/media_relations/press_releases/2011/2011_01_03_press_release.aspx

Natural disasters 'killed 295,000 in 2010

<http://news.brisbanetimes.com.au/breaking-news-world/natural-disasters-killed-295000-in-2010-20110104-19e06.html>

Mapping the impacts of natural hazards and technological accidents in Europe'

<http://www.eea.europa.eu/publications/mapping-the-impacts-of-natural>

Disasters in Europe: more frequent and causing more damage

http://www.eea.europa.eu/highlights/natural-hazards-and-technological-accidents?utm_source=EEASubscriptions&utm_medium=RSSFeeds&utm_campaign=Generic

¹⁰⁴December 2010

Near record temperatures in 2010 to be followed by cooler 2011

<http://www.metoffice.gov.uk/corporate/pressoffice/2010/pr20101202b.html>

2010 sets new temperature records

<http://www.bbc.co.uk/news/science-environment-11903397>

How Will We Know if 2010 Was the Warmest Year on Record?

<http://www.climatecentral.org/news/tracking-the-temperature-of-a-warming-planet/>

Warmest November on Record, NASA Data Shows

<http://www.climatecentral.org/blog/warmest-november-on-record-nasa-data-shows/>

Climate Vulnerability Monitor 2010 report

<http://daraint.org/climate-vulnerability-monitor/climate-vulnerability-monitor-2010/>

Climate change effects vary widely between rich and poor countries

http://www.contracostatimes.com/environment/ci_16947877?nclick_check=1

Global Climate Risk Index 2011

<http://www.germanwatch.org/klima/cri.htm>

¹⁰⁵November 2010

Flood-Devastated Benin Requests Millions for Emergency Aid

<http://www.circleofblue.org/waternews/2010/world/africa/flood-devastated-benin-requests-millions-for-emergency-aid/>

Benin suffers worst floods since 1963

<http://www.guardian.co.uk/world/2010/oct/25/benin-worst-floods-since-1963>

Natural Hazards, UnNatural Disasters: The Economics of Effective Prevention

<http://www.gfdrr.org/gfdrr/node/281>

¹⁰⁶October 2010

Warmer Arctic Probably Permanent, Scientists Say

<http://planetark.org/wen/59961>

¹⁰⁷ **September 2010**

Medvedev's Climate Moment

<http://www.themoscowtimes.com/mobile/article/413772.html> (Subscription required)

Record Heat Spawns Stronger Hurricanes Over Atlantic

<http://www.sfgate.com/cgi-bin/article.cgi?f=/g/a/2010/09/21/bloomberg1376-L91WX91A74E901-7919GG82QU9A38LTC82K8LVE8S.DTL>

National Hurricane Center

<http://www.nhc.noaa.gov/2010atlan.shtml>

¹⁰⁸ **August 2010**

Global warming signs unmistakable: report

<http://www.cbc.ca/technology/story/2010/07/29/climate-change-study-noaa.html>

WMO Information on Current Extreme Events:

http://www.wmo.int/pages/mediacentre/news/extremeweathersequence_en.html

Climate change responsible for floods: experts

<http://www.dawn.com/wps/wcm/connect/dawn-content-library/dawn/the-newspaper/front-page/climate-change-responsible-for-floods-experts-380>

China's Heavy Rains Blamed on Unusual Climate Patterns

<http://www.voanews.com/english/news/Chinas-Heavy-Rains-Blamed-on-Unusual-Climate-Patterns-101458654.html>

Extreme hot, cold waves torturing world

<http://english.peopledaily.com.cn/90001/90777/90852/7088455.html>

¹⁰⁹ **July 2010**

Coral reefs suffer mass bleaching

<http://www.telegraph.co.uk/earth/earthnews/7896403/Coral-reefs-suffer-mass-bleaching.html>

Ocean Warming Slows Coral Growth in the Central Red Sea

<http://www.sciencemag.org/cgi/content/abstract/sci.329/5989/322?maxtoshow=&hits=10&RESULTFORMAT=&fulltext=Red+Sea+coral&searchid=1&FIRSTINDEX=0&resourcetype=HWCIT>

Plankton, base of ocean food web, in big decline

http://news.yahoo.com/s/ap/20100728/ap_on_sc/us_sci_declining_plankton

MIGRATION TRIGGERED BY ENVIRONMENTAL CAUSES

Climate Refugees Trends

Military Implications:

[Same as other on similar issues] The military should identify all resources and programs for reducing GHGs and responding to effects of climate change, update information continuously, forecast how it might be called upon for both mitigation and adaptation, and perform a gap analysis in anticipation of future requests. International discourse over climate change is

increasing the development of international policies and strategies to mitigate and adapt to climate change.

Sources:

¹¹² **December 2010**

UN High Commissioner Guterres welcomes breakthrough Mexico legislation on international protection
<http://www.unhcr.org/4d025bb66.html>

On the move in a warming world: The rise of climate refugees

<http://www.theglobeandmail.com/news/world/africa-mideast/on-the-move-in-a-warming-world-the-rise-of-climate-refugees/article1843024/page1/>

World Migration Report 2010

http://publications.iom.int/bookstore/free/WMR_2010_ENGLISH.pdf

¹¹³ **November 2010**

Kiribati's Tarawa Climate Change Conference (TCCC)

http://www.climate.gov.ki/tarawa_climate_change_conference.html

¹¹⁴ **August 2010**

Climate Change Displaced Persons Convention Project

<http://www.ccdpconvention.com/index.html> (see FAQ)

If a Country Sinks Beneath the Sea, Is It Still a Country?

<http://www.nytimes.com/cwire/2010/08/23/23climatewire-if-a-country-sinks-beneath-the-sea-is-it-sti-70169.html?ref=earth>

South Pakistan floods displace a million in 48 hours

<http://www.bbc.co.uk/news/world-south-asia-11105661>

Pakistan -- a Sad New Benchmark in Climate-Related Disasters

<http://www.nytimes.com/cwire/2010/08/18/18climatewire-pakistan----a-sad-new-benchmark-in-climate-re-4283.html> (article accessible free for a limited time; full text in the [Appendix](#))

¹¹⁵ **July 2010**

Urgent Action Needed for Pastoralists to Cope with Climate Change

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=628&ArticleID=6634&l=en&t=long>

Security in Mobility Launch: Key Note Address: Mr. Mark Bowden, HC for Somalia

<http://ochaonline.un.org/OchaLinkClick.aspx?link=ocha&docId=1165384> (Ms Word format; if experiencing problems, try item "29 June 2010; Security in Mobility Launch: Key Note Address...")

<http://ochaonline.un.org/kenya/Advocacy/SecurityinMobility/tabid/6735/language/en-US/Default.aspx>

Greater Horn of Africa: EU Commission allocates € 20 million to support 12 million victims of recurrent droughts

http://europa-eu-un.org/articles/en/article_9879_en.htm

Migratory Responses to Agricultural Risk in Northern Nigeria. IFPRI Discussion Paper 01007
<http://www.ifpri.org/sites/default/files/publications/ifpridp01007.pdf>

¹¹⁶ **Renewed Protection for Refugees in Latin America**

Military Implications:

SOUTHCOM and other military and security personnel in Latin America should consider the implications of future increasing environmental refugees in light of the principles stipulated in the Declaration, when designing security strategies.

Sources:

Latin America nations pledge more for the protection of the displaced and stateless

<http://www.unhcr.org/4cdd4dc09.html>

UN lauds Latin America's declaration on refugee protection

<http://www.globalsecurity.org/military/library/news/2010/11/mil-101112-unnews01.htm>

Brasilia Declaration on the Protection of Refugees and Stateless Persons in the Americas

<http://www.unhcr.org/4cdd3fac6.html>

MELTING SEA ICE AND GLACIERS

Military Implications:

[Same as other on similar issues] The military should identify all resources and programs for reducing GHGs and responding to effects of climate change, update information continuously, forecast how it might be called upon for both mitigation and adaptation, and perform a gap analysis in anticipation of future requests. International discourse over climate change is increasing the development of international policies and strategies to mitigate and adapt to climate change.

Sources:

¹¹⁸ **January 2011**

2010 equals record for world's warmest year

http://www.wmo.int/pages/mediacentre/press_releases/pr_906_en.html

Greenland's ice feels the heat in record-setting 2010

<http://www.nytimes.com/cwire/2011/01/21/21climatewire-greenlands-ice-feels-the-heat-in-record-sett-93789.html>

¹¹⁹ **December 2010**

Antarctic Melting as Deep Ocean Heat Rises

<http://news.discovery.com/earth/antarctica-melting-warming-penguins-101214.html>

¹²⁰ **August 2010**

Greenland glacier calves island 4 times the size of Manhattan, UD scientist reports

<http://www.udel.edu/udaily/2011/aug/greenland080610.html>

Greenland's giant island of ice could pose threat to offshore platforms, shipping

<http://www.winnipegfreepress.com/world/breakingnews/greenlands-giant-island-of-ice-could-pose-threat-to-offshore-platforms-shipping-100369689.html>

Borehole network confirms, permafrost is thawing worldwide

http://thearcticsounder.com/article/1032borehole_network_confirms_permafrost_is

FOOD AND FRESHWATER

Food Scarcity Issues

Military Implications:

[Same as other on similar issues] The military should identify all resources and programs for reducing GHGs and responding to effects of climate change, update information continuously, forecast how it might be called upon for both mitigation and adaptation, and perform a gap analysis in anticipation of future requests. International discourse over climate change is increasing the development of international policies and strategies to mitigate and adapt to climate change.

Sources: (Listed by month in reverse chronological order)

¹²³ **January 2011**

Global Risk 2011

<http://riskreport.weforum.org/>

Extreme Weather Helps Drive Up Food Prices

<http://green.blogs.nytimes.com/2011/01/05/extreme-weather-sends-food-prices-soaring/?partner=rss&emc=rss>

Policy guide for countries hit hard by high food prices

<http://www.fao.org/news/story/en/item/49954/icode/>

Authoritarian governments start stockpiling food to fight public anger

<http://www.telegraph.co.uk/news/worldnews/middleeast/8288555/Authoritarian-governments-start-stockpiling-food-to-fight-public-anger.html>

Indonesia's President says food security must be G20 priority

<http://www.google.com/hostednews/afp/article/ALeqM5gmhg0nKzrqDTGK9ww6o9bUkohyGQ?docId=CNG.7cf561b86d25fb9fcfc035de4e9a829a.f1>

¹²⁴ **August 2010**

African nations dominate Maplecroft's new Food Security Risk Index - China and Russia will face challenges

<http://www.maplecroft.com/about/news/food-security.html>

¹²⁵ **December 2010**

Agriculture Must Play Key Role In Climate Solutions

<http://go.worldbank.org/3SYJZL2PN0>

World leaders announce roadmap for action on agriculture, food security and climate change

<http://www.agricultureday.org/blog/index.php/?p=423>

African Farmers Displaced as Investors Move In

<http://www.nytimes.com/2010/12/22/world/africa/22mali.html?nl=todaysheadlines&emc=a22>

Africa mulls biofuels as land grab fears grow

<http://www.reuters.com/article/idUSTRE6AT3ZE20101130>

Food security, farming, and climate change to 2050

<http://www.ifpri.org/publication/food-security-farming-and-climate-change-2050>

¹²⁶ **November 2010**

The United Nations had previously projected that grain yields would grow 1.2% this year. Food Outlook report

<http://www.fao.org/docrep/013/al969e/al969e00.pdf>

One trillion food import bill as prices rise

<http://www.fao.org/news/story/en/item/47733/icode/>

World 'Dangerously Close' to Food Crisis, U.N. Says

<http://green.blogs.nytimes.com/2010/11/24/world-dangerously-close-to-food-crisis-u-n-says/>

It's Down 2 Earth - Global Conference on Agriculture, Food Security and Climate Change

<http://www.iisd.ca/ymb/afconference>

Global Conference on Agriculture, Food Security and Climate Change

<http://www.afconference.com/>

Roadmap for Action

<http://www.afconference.com/final-roadmap-for-action>

FAO site on climate-smart agriculture

<http://www.fao.org/climatechange/climatesmart/en/>

¹²⁷ **October 2010**

State of Food Insecurity in the World

<http://www.fao.org/publications/sofi/en/>

Long-term crises keep 22 nations in hunger trap – FAO

<http://www.alertnet.org/db/art/57964/2010/09/7-120439-1.htm>

Farmers Hurt As Pressure On Arable Land Grows: U.N.

<http://planetark.org/wen/59953>

¹²⁸ **September 2010**

925 million in chronic hunger worldwide

<http://www.fao.org/news/story/en/item/45210/icode/>

Food price volatility a major threat to food security

<http://www.fao.org/news/story/en/item/45690/icode/>

Food Commodities Speculation and Food Price Crises

http://www.srfood.org/images/stories/pdf/otherdocuments/20102309_briefing_note_02_en.pdf

ActionAid report “Who’s really fighting hunger?”

<http://www.actionaid.org/assets/pdf/ActionAid-scorecard-report-2010.pdf>

The UK Food Group meeting– Securing Future Food

http://www.ukfg.org.uk/docs/Securing_Future_Food_Draft_Agenda.pdf

UN warned of major new food crisis at emergency meeting in Rome

<http://www.guardian.co.uk/environment/2010/sep/24/food-crisis-un-emergency-meeting-rome>

As food prices jump, UN group tries to avoid fuelling new crisis

<http://www.theglobeandmail.com/globe-investor/potash/rising-food-prices-key-to-battle-for-potash-corp/article1697548/>

Rising Global Interest in Farmland: Can It Yield Sustainable and Equitable Benefits? Report

http://siteresources.worldbank.org/INTARD/Resources/ESW_Sept7_final_final.pdf

New World Bank Report Sees Growing Global Demand for Farmland. Risks and Opportunities for the Developing World

<http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:22694767~pagePK:64257043~piPK:437376~theSitePK:4607,00.html>

Take Action to Stem Risks of Overseas Agriculture Investments, Warn Groups

<http://ictsd.org/i/news/biores/84541/>

¹²⁹ **August 2010**

Hotter nights threaten food security - rice at risk

<http://www.fao.org/news/story/en/item/44618/icode/>

Chinese soil experts warn of massive threat to food security

<http://www.scidev.net/en/news/chinese-soil-experts-warn-of-massive-threat-to-food-security.html>

Russian Export Ban Raises Global Food Fears

http://online.wsj.com/article/NA_WSJ_PUB:SB10001424052748703748904575410740617512592.html

Putin bans Russia grain exports due to drought

http://news.yahoo.com/s/afp/20100805/ts_afp/russiaheatwavefiresfarmcropscommoditiesgrain_20100805162243

The Food Security and Climate Change in Dry Areas meeting

http://www.icarda.org/Announcement/2009/IntlConfrnc_FoodSecurity/FoodSecurityAndClimateChangeInDryAreas_2009.htm

Food security and climate change in dry areas: Abstracts (En)

<http://icardablog.wordpress.com/2010/07/20/food-security-and-climate-change-in-dry-areas-abstracts-en/>

¹³⁰ **Food Security Threatened by Diminishing Low-Cost Phosphorus**

Military Implications:

Phosphorus use, conservation, and long-term supply should be added to long-term strategic studies and programs for management of scarce materials and resources for conflict prevention.

Sources:

Elemental Shortage

<http://www.the-scientist.com/article/display/57777/>

The Story of Phosphorus: Sustainability implications of global phosphorus scarcity for food security

<http://urn.kb.se/resolve?urn=urn:nbn:se:liu:diva-53430>

Freshwater Scarcity Issues

Military Implications:

[Same as other on similar issues] The military should identify all resources and programs for reducing GHGs and responding to effects of climate change, update information continuously, forecast how it might be called upon for both mitigation and adaptation, and perform a gap analysis in anticipation of future requests. International discourse over climate change is increasing the development of international policies and strategies to mitigate and adapt to climate change.

Sources: (Listed by month in reverse chronological order)

¹³² **December 2010**

UAE-GCC SUMMIT: Abu Dhabi Water Declaration calls for adoption of modern farming technologies

http://ipsnotizie.it/wam_en/news.php?idnews=7963

UAE leads water security agenda

<http://www.thenational.ae/news/uae-news/environment/uae-leads-water-security-agenda>

Abu Dhabi Water Declaration calls for adoption of modern farming technologies

http://www.uaeinteract.com/docs/Abu_Dhabi_Water_Declaration_calls_for_adoption_of_modern_farming_technologies/43642.htm

Managing Blue Gold: New Perspectives on Water Security in the Levantine Middle East

http://www.upi-fiia.fi/en/publication/154/managing_blue_gold/

Managing Blue Gold: New Perspectives on Water Security in the Levantine Middle East--
Launching event highlight

<http://www.upi-fiia.fi/en/event/317/>

Water as a Strategic Resource in the Middle East

<http://csis.org/publication/clear-gold>

¹³³ **November 2010**

New atlas shows Africa's vulnerable water resources in striking detail

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=651&ArticleID=6843&l=en&t=long>

Africa Water Atlas

<http://na.unep.net/atlas/africaWater/book.php>

¹³⁴ **October 2010**

ADB: Asia Needs \$8 Billion Annual Investment In Water

<http://planetark.org/wen/59839>

¹³⁵ **September 2010**

The paper “Water Storage in an Era of Climate Change: Addressing the Challenge of Increasing Rainfall Variability”

http://www.iwmi.cgiar.org/Publications/Blue_Papers/PDF/Blue_Paper_2010-final.pdf

¹³⁶ **July 2010**

Water Issues between Nepal, India & Bangladesh. IPCS paper

http://www.ipcs.org/pdf_file/issue/SR95.pdf

Water Dispute Increases India-Pakistan Tension

<http://www.nytimes.com/2010/07/21/world/asia/21kashmir.html>

India-Pakistan water treaty poised to burst

<http://www.theglobeandmail.com/news/world/asia-pacific/india-pakistan-water-treaty-poised-to-burst/article1652763/>

UN humanitarian chief: 10 million in Africa's drought-stricken Sahel hungry, need help

http://www.google.com/hostednews/canadianpress/article/ALeqM5jeg5Eoxjn-ivdeZ-vjPDaLa_RTNA

HEALTH

Potential Impacts of Climate Change

Military Implications:

[Same as other on similar issues] The military should identify all resources and programs for reducing GHGs and responding to effects of climate change, update information continuously, forecast how it might be called upon for both mitigation and adaptation, and perform a gap analysis in anticipation of future requests. International discourse over climate change is increasing the development of international policies and strategies to mitigate and adapt to climate change.

Sources: (Listed by month in reverse chronological order)

¹³⁹ **January 2011**

Animal Migration and Infectious Disease Risk. Science 331, 6015: pp. 296-302

<http://www.sciencemag.org/content/331/6015/296.full?ijkey=uTHIpzF2u3UUw&keytype=ref&siteid=sci>

Changes in wildlife migration could alter disease risk

<http://www.scidev.net/en/agriculture-and-environment/news/changes-in-wildlife-migration-could-alter-disease-risk.html>

¹⁴⁰ **November 2010**

Geneva consultation on Essential Public Health Package to Enhance Climate Resilience in Least Developed Countries

http://www.who.int/globalchange/mediacentre/events/2010/geneva_consultation_07092010/en/index.html

Essential Public Health Package, Consultation Report

http://www.who.int/globalchange/mediacentre/events/2010/EssentialPublicHealthPackage_September_2010_Consultation_Meeting_Report.pdf

¹⁴¹ **August 2010**

Country experiences of assessing health implications of climate change

<http://climatehealth.wordpress.com/2010/08/04/country-experiences-on-assessing-health-implications-of-climate-change/>

¹⁴² **UNEP Study on Inter-Linkages of Climate Change, POPs, and Human Health**

Military Implications:

The impact of climate change on releasing potentially toxic chemicals might trigger new international discussions on disclosure and accelerating the cleanup of POP sites, including military bases and/or abandoned weapons. [See *CCW Protocol V on Explosive Remnants of War Entered into Force* in November 2006 environmental security report.]

Sources:

Climate change increases vulnerability of planet to Persistent Organic Pollutants

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=653&ArticleID=6862&l=en>

Climate Change Increases Planet's Vulnerability to Persistent Organic Pollutants

<http://chm.pops.int/Convention/Media/Pressreleases/UNFCCC/COP16/ClimateChangeCancun7Dec2010/tabid/1269/language/en-US/Default.aspx>

ENERGY SECURITY

¹⁴⁴ **Scientists Create 20-Year Roadmap for Nuclear Energy**

Military Implications:

Military and related security personnel should assess this nuclear roadmap for possible contributions to increasing and/or decreasing the potential for hijacking of nuclear material, as well as improved and safer recycling of nuclear waste and related security issues. A new

regulation-inspection-compliance regime would be required and have to be enforced (involving national security decision-makers).

Sources:

Scientists call for a global nuclear renaissance in new study

<http://www.physorg.com/news200842486.html>

Experts say federal nuclear waste panel overlooks public mistrust

<http://www.physorg.com/news200842407.html>

¹⁴⁵ **World Energy Outlook 2010**

Military Implications:

WEO-2010 deserves careful study because it provides insights into the potential evolution of the current energy system and thus world energy security, as well as policies and alternatives for a more energy-efficient society.

Source:

World Energy Outlook 2010

<http://www.worldenergyoutlook.org/>

¹⁴⁶ **China is Now the Largest Energy Consumer in the World**

Military Implications:

This milestone in China's energy consumption is a warning to relevant military personal to explore a full range of military-to-military options with China for improved environmental security.

Sources:

China overtakes the United States to become world's largest energy consumer

http://www.iea.org/index_info.asp?id=1479

Global carbon emissions steady for first time since 1992

<http://www.guardian.co.uk/environment/2010/jul/01/emissions-recession>

No growth in total global CO₂ emissions in 2009

<http://www.pbl.nl/en/publications/2010/No-growth-in-total-global-CO2-emissions-in-2009.html>

Climate change biggest restriction on China's development –economist

http://www.alertnet.org/db/an_art/60714/2010/06/9-162342-1.htm

¹⁴⁷ **Nordic Countries to Support Mekong Energy and Environment Partnership**

Military Implications:

The Energy and Environment Partnership can also be used for confidence building and conflict prevention in the vulnerable Mekong region. Although at present this is an exclusively Nordic project, U.S. environmental organizations should investigate to determine if they could usefully participate in this cooperative effort.

Source:

Finland to provide clean-up solutions for environment

<http://vietnamnews.vnagency.com.vn/Environment/203445/Finland-to-provide-clean-up-solutions-for-environment.html>

¹⁴⁸ **Coal-fired Power Plants under Fire**

Military Implications:

Military bases dependent on coal-fired plants should review their energy requirements in light of these policy changes that could close coal plants earlier than expected and raise costs.

Sources:

Analysis: Toxic Fish Could Help Obama Hit 2020 Climate Goals

<http://planetark.org/wen/58929> (This site may require a subscription.)

Senator Milne said this could be achieved by 2030 with the right preparation and infrastructure.

Greens say coal must go

<http://www.smh.com.au/federal-election/climate/greens-say-coal-must-go-20100724-10pmh.html>

PREVENTION AND ADAPTATION

Military Implications:

[Same as other on similar issues] The military should identify all resources and programs for reducing GHGs and responding to effects of climate change, update information continuously, forecast how it might be called upon for both mitigation and adaptation, and perform a gap analysis in anticipation of future requests. International discourse over climate change is increasing the development of international policies and strategies to mitigate and adapt to climate change.

Sources: (Listed by month in reverse chronological order)

¹⁵⁰ **December 2010**

Latin America and the Caribbean: Atlas of our Changing Environment

http://www.cathalac.org/lac_atlas/

New atlas maps future of the environment in Latin America and Caribbean

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=653&ArticleID=6867&l=en&t=long>

Economics of Climate Change in Latin America and the Caribbean

<http://www.eclac.cl/cgi-bin/getProd.asp?xml=/publicaciones/xml/9/41909/P41909.xml&xsl=/dmaah/tpl-i/p9f.xsl&base=/dmaah/tpl/top-bottom.xsl>

Climate Change Is Expected to Cost Latin American Countries at Least 1% of Annual GDP

<http://www.eclac.org/cgi->

bin/getProd.asp?xml=/prensa/noticias/comunicados/7/41947/P41947.xml&xsl=/prensa/tpl-i/p6f.xsl&base=/tpl-i/top-bottom.xsl

Climate change to trim Latin America growth: UN

http://news.yahoo.com/s/afp/20101208/sc_afp/unclimatewarminglatam

¹⁵¹ **November 2010**

Guiding principles for adaptation to climate change in Europe ETC/ACC Technical Paper 2010/6

http://air-climate.eionet.europa.eu/reports/ETCACC_TP_2010_6_guid_princ_cc_adapt

ITU Symposium on ICTs and the Environment & Climate Change

<http://www.itu.int/ITU-T/worksem/climatechange/201011/>

¹⁵² **October 2010**

UNISDR urges mayors and citizens to decrease disaster losses

http://www.unisdr.org/preventionweb/files/15810_2010no24.pdf

UN Secretary-General's Message on International Day for Disaster Reduction

<http://www.un.org/News/Press/docs/2010/sgsm13175.doc.htm>

Parliamentarians urged to take action on disaster reduction

<http://www.unisdr.org/news/v.php?id=15724>

UNECA Press Release on the Opening Plenary

http://uneca.org/eca_resources/Press_Releases/2010_pressreleases/pressrelease7010.html

UNEP Press Release

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=649&ArticleID=6781&l=en&t=long>

UN Press Release

<http://www.un.org/apps/news/story.asp?NewsID=36467&Cr=climate+change&Cr1=>

Forum Website

<http://www.unece.org/adfvii/>

¹⁵³ **September 2010**

UNESCAP Press Release: <http://www.unescap.org/unis/press/2010/sep/g39.pdf>

World Disasters Report 2010 - Is urban the new rural?

<http://www.ifrc.org/publicat/wdr2010/index.asp>

¹⁵⁴ **August 2010**

Economics of Adaptation to Climate Change

<http://beta.worldbank.org/content/economics-adaptation-climate-change-study-homepage>

Synthesis Report on the Economics of Adaptation to Climate Change Study

http://siteresources.worldbank.org/EXTCC/Resources/EACC_FinalSynthesisReport0803_2010.pdf

UN Decade for Deserts and the Fight Against Desertification Website

<http://unddd.unccd.int>

UN launches decade-long drive to combat desertification

<http://www.un.org/apps/news/story.asp?NewsID=35633&Cr=desert&Cr1=>

UN Secretary-General's High-level Panel on Global Sustainability

<http://www.un.org/wcm/content/site/climatechange/pages/gsp>

Pacific Platform 2010

<http://www.pacificdisaster.net:8080/Plone/pacific-platform-2010#section-2>

UNDP Pacific Centre Press Release

<http://www.undppc.org.fj/pages.cfm/newsroom/press-releases/2010/pacific-partnering-with-caribbean-better-mitigation-of-natural-disasters-climate-change-.html>

¹⁵⁵ **July 2010**

World Investment Report 2010

<http://www.unctad.org/Templates/WebFlyer.asp?intItemID=5535&lang=1>

Reports on Sustainability and Climate Change

Military Implications:

Military personnel with sustainability and climate change responsibilities should review these reports for potential applications.

Sources:

¹⁵⁷ **July 2010**

The Business of Sustainability

<http://sloanreview.mit.edu/special-report/the-business-of-sustainability/>

The Business of Sustainability - Findings from the first annual survey and interview project

<http://www.mitsmr-ezine.com/busofsustainability/2009#pg1>

Informing an Effective Response to Climate Change

http://www.nap.edu/catalog.php?record_id=12784

¹⁵⁸ **FAO Launches Global Fire Information Management System**

Military Implications:

The GFIMS system could help save lives and livelihoods and reduce environmental disasters caused by fire, thus reducing factors that could lead to, or exacerbate conflict situations. Relevant military and security personnel involved in environmental security operations should ensure that they are making full use of GFIMS's capabilities.

Sources:

Poor to benefit from global fire monitoring system

<http://www.scidev.net/en/news/poor-to-benefit-from-global-fire-monitoring-system.html>

GFIMS: <http://www.fao.org/nr/gfims/gf-home/en/>

¹⁵⁹ **New Global Land Cover Maps**

Military implications:

These maps could be useful in identifying future environmental hotspots and other issues of environmental security.

Sources:

European Space Agency and the Belgian Université Catholique de Louvain

<http://ionia1.esrin.esa.int/>

ESA's GlobCorine project

<http://ionia1.esrin.esa.int/globcorine/>

Atlas on the state of the environment in Latin America and the Caribbean

http://www.cathalac.org/lac_atlas/

on-line National Atlas of the U.S.

<http://nationalatlas.gov/>

CLIMATE MODELING

Military Implications:

[Same for all on similar issues] The military should identify all resources and programs for reducing GHGs and responding to effects of climate change, update information continuously, forecast how it might be called upon for both mitigation and adaptation, and perform a gap analysis in anticipation of future requests. International discourse over climate change is increasing the development of international policies and strategies to mitigate and adapt to climate change.

Sources:

¹⁶¹ **January 2011**

Climate change to Continue to Year 3000 in Best Case Scenarios, Research Predicts

<http://www.sciencedaily.com/releases/2011/01/110109184025.htm>

Ongoing climate change following a complete cessation of carbon dioxide emissions

<http://www.nature.com/ngeo/journal/vaop/ncurrent/full/ngeo1047.html>

¹⁶² **July 2010**

The Future Climate for Development

<http://www.forumforthefuture.org/projects/the-future-climate-for-development>

Low carbon, high hopes

<http://blogs.dfid.gov.uk/2010/07/low-carbon-high-hopes/>

¹⁶³ **October 2010**

Drought may threaten much of globe within decades

<http://www2.ucar.edu/news/climate-change-drought-may-threaten-much-globe-within-decades>

NOAA's Palmer Drought Severity Index
<http://www.drought.noaa.gov/palmer.html>

Scenarios

¹⁶⁵ **July 2010**

The Future Climate for Development
<http://www.forumforthefuture.org/projects/the-future-climate-for-development>

C. Protecting the Environment Due to Its Inherent Moral Value

ENVIRONMENTAL SECURITY-RELATED INTERNATIONAL REGULATIONS THAT HAVE BEEN OR ARE CLOSE TO COMING INTO FORCE SINCE JULY 2010

Broad Environmental Aspects

¹⁶⁹ **Progress on International Environmental Governance**

Military Implications:

Military personnel with international environmental responsibilities should seek collaboration with the Consultative Group to ensure that security concerns are included in the most effective way in the new international environmental governance reform proposals.

Sources:

First Meeting of the Consultative Group, Nairobi 7-9 July 2010

<http://www.unep.org/environmentalgovernance/Introduction/GCfeb2010/tabid/4556/language/en-US/Default.aspx>

The Co-Chairs' Summary and Roadmap

<http://www.unep.org/environmentalgovernance/Introduction/GCfeb2010/tabid/4556/language/en-US/Default.aspx>

¹⁷⁰ **The Protocol on Strategic Environmental Assessment to the UNECE Espoo Convention Entered into Force on July 11, 2010**

Military Implications:

Relevant military personnel stationed in Europe should review the new SEA Protocol requirements for specific implications for planning new activities and projects.

Source:

Protocol on Strategic Environmental Assessment (Kyiv, 2003)

http://www.unece.org/env/eia/sea_protocol.htm

¹⁷¹ Repository of Multilateral Environmental Agreements*Military Implications:*

The book provides a comprehensive tool for legal practitioners and all those who are using MEAs in their work.

Sources:

Multilateral Environmental Agreements. State of Affairs and Developments 2010

<http://www.isbs.com/partnumber.asp?cid=28591&pnid=326458>

Biodiversity**¹⁷³ New International Mechanisms Adopted for Protection of Biodiversity***Military Implications:*

[Similar to previous on this issue] Increased coherence among biodiversity agreements, UN-related bodies, and capacity building should lead to greater attention being paid to biodiversity impacts of military training and other operations. Military liaisons should explore opportunities for cooperation and applications of the Army Strategy for the Environment as this integration evolves with monitoring and enforcement organizations. Also, military and other security personnel should anticipate increased international adherence to the concept of calculating the environmental footprint and an increased number of protected regions.

Sources:

COP 10 Outcomes

<http://www.cbd.int/nagoya/outcomes/>

Nagoya biopiracy agreement 'is unexpected success'

<http://www.scidev.net/en/agriculture-and-environment/indigenous-knowledge/news/nagoya-biopiracy-agreement-is-unexpected-success-.html>

No to Geo-Engineering: UN Issues a Moratorium on Efforts to Manipulate the Earth's Climate

http://www.alternet.org/environment/148768/no_to_geo-engineering%3A_un_issues_a_moratorium_on_efforts_to_manipulate_the_earth's_climate

Research into the possibility of engineering a better climate is progressing at an impressive rate—and meeting strong opposition

<http://www.economist.com/node/17414216>

Chemicals and other Hazardous Compounds**¹⁷⁵ Amendments Adding Nine Chemicals to the Stockholm Convention Entered into Force***Military Implications:*

[Similar to previous on this issue] Although the U.S. is not Party to the Stockholm Convention, since several of these POPs are widely used worldwide, it should be prepared to comply with the requirements when acting in countries Party. Thus, it should consider the military implications of

the additional substance phaseouts and find replacements if necessary. Since interoperability among allies depends upon the harmony of acceptance of and compliance with international conventions, security organizations need to remain fully up-to-date on agreements on the status of chemicals, whether or not they or their state is Party to the Convention.

Sources:

Entry into Force of the Amendments adding Nine Chemicals to the Stockholm Convention on Persistent Organic Pollutants on 26 August 2010

<http://chm.pops.int/default.aspx>

Amendments to global treaty launched to eliminate nine toxic chemicals

http://www.pic.int/Press/Press_release_POPs_Amendment{EIF_2010.08.26_final.doc

¹⁷⁶ Stockholm Convention on Persistent Organic Pollutants (POPs) Updated

Military Implications:

The decisions from POPRC-6 should be studied by military and security personnel with responsibilities that include persistent organic pollutants in order to improvement their own procedures. [Similar to previous on this issue] Although the U.S. is not Party to the Stockholm Conventions, it should be prepared to comply with the requirements when acting in countries Party. Thus, such personnel should consider the implications of the new listing of these substances, and—if the cases require—find replacements.

Source:

Sixth Meeting of the Persistent Organic Pollutants Review Committee (POPRC6) to the Stockholm Convention on Persistent Organic Pollutants (POPs)

<http://www.iisd.ca/vol15/enb15176e.html>

¹⁷⁷ **EU Parliament Adopts Restrictions on Nanoproducts**

Military Implications:

Military operations in the EU area should be prepared to adjust procurement plans accordingly, to comply with the new decision. The EU decision could lead other countries to implement similar policies until health and environmental safety is assured.

Sources:

MEPs call for ban on food from cloned animals

http://www.europarl.europa.eu/news/expert/infopress_page/067-77912-186-07-28-911-20100706IPR77911-05-07-2010-2010-false/default_en.htm

European Environmental Bureau welcomes European Parliament's vote on nanofoods

http://www.nanowerk.com/news/newsid=17069.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29

¹⁷⁸ Germany publishes criteria for substances of very high concern*Military Implications:*

The military should familiarize itself with Germany's SVHC criteria to ensure Status of Forces Agreement compliance in Germany, while also continuing to monitor the European Chemicals Agency (ECHA) REACH SVHC authorization process, including prudent military procurement and R&D for safe substitutes.

Sources:

German risk institute publishes SVHC criteria

<http://chemicalwatch.com/4742>

BfR criteria for the selection of candidate substances for the authorisation procedure under REACH

http://www.bfr.bund.de/cm/290/bfr_criteria_for_the_selection_of_candidate_substances_for_the_authorisation_procedure_under_reach.pdf

¹⁷⁹ UN Resolution Acknowledges Access to Clean Water and Sanitation a Human Right*Military Implications:*

Military-to-military personnel concerned with water-related causes of conflict should be made aware of this resolution to add justification to their continued or expanded operations. Although the resolution is voluntary, it gives a new rationale to all organizations, including peacekeeping and other military entities, to increase their efforts towards improving the water situation in the regions where they are stationed or are operating. The resolution increases the likelihood that actions by public and private security actors will be scrutinized more often and more thoroughly for their impact on water, up to and possibly including provoking charges of "aggression".

Sources:

General Assembly Adopts Resolution Recognizing Access to Clean Water, Sanitation as Human Right, by Recorded Vote of 122 in Favor, None against, 41 Abstentions

<http://www.un.org/News/Press/docs/2010/ga10967.doc.htm>

General Assembly declares access to clean water and sanitation is a human right

<http://www.un.org/apps/news/story.asp?NewsID=35456&Cr=sanitation&Cr1>

¹⁸⁰ UN Human Rights Council Affirms Right to Water as Legally-Binding*Military Implications:*

Senior military personal should explore military roles in implementing this resolution to reduce water-related conflicts in the future. Military-to-military personnel concerned with water-related causes of conflict should be made aware of this resolution to add justification to their continued or expanded operations. Since the UN Human Rights Council resolution is binding, it gives a new rationale to all organizations, including peacekeeping and other military entities, to increase their efforts towards improving the water situation in the regions where they are stationed or are operating. The resolution increases the likelihood that actions by public and private security actors will be scrutinized more often and more thoroughly for their impact on water, up to and possibly including provoking charges of "aggression".

Sources:

UN united to make the right to water and sanitation legally binding

[http://www.ohchr.org/en/NewsEvents/Pages/DisplayNews.aspx?NewsID=10403&LangID=E15/...](http://www.ohchr.org/en/NewsEvents/Pages/DisplayNews.aspx?NewsID=10403&LangID=E15/) Human rights and access to safe drinking water and sanitation. Human Rights Council Resolution A/HRC/15/L.14 (Sept. 24, 2010)
<http://daccess-dds-ny.un.org/doc/UNDOC/LTD/G10/163/09/PDF/G1016309.pdf?OpenElement>
UN landmark decision: right to water and sanitation is legally binding
<http://internationallawobserver.eu/2010/10/14/un-landmark-decision-right-to-water-and-sanitation-is-legally-binding>

¹⁸¹ **European Parliament Resolution on Jordan River Water Management Reform**

Military Implications:

Previous collaborations on water issues helped ameliorate conflict situations in several regions, including the Middle East. Environmental diplomacy and international military cooperation should be used to explore how to turn around the deterioration of the Jordan River and use this opportunity to further confidence and peace building. Additionally, military-civilian policy research is needed to clarify when intervention should be initiated to prevent or halt actions whose most likely result is inter-state or intra-state violence.

Sources:

Situation of the Jordan River with special regard to the Lower Jordan River area:

<http://www.europarl.europa.eu/sides/getDoc.do?type=TA&reference=P7-TA-2010-0314&format=XML&language=EN>

European Parliament passes historic resolution in support of regional rehabilitation of the Lower Jordan River

http://foeme.org/www/?module=media_releases&record_id=85

Marine Environment

¹⁸³ **IMO MEPC Revises MARPOL, Addresses Emissions from Ships**

Military Implications:

[Same as previous on this issue] Although emissions from military ships make up only a tiny fraction of this polluting source, the Navy should be prepared for new international anti-pollution regulations that may not exempt military craft.

Sources:

IMO Environment meeting discusses GHG measures for new ships

http://www5.imo.org/SharePoint/mainframe.asp?topic_id=1859&doc_id=13710

Revised MARPOL Annex III adopted at IMO environment meeting

http://www5.imo.org/SharePoint/mainframe.asp?topic_id=1859&doc_id=13711

¹⁸⁴ Chile Establishes 150,000 KM2 Protected Marine Reserve in Pacific

Military Implications:

Activities in and around the new reserve need to take pains to avoid infringing upon the sovereign waters and disturbing any of the local ecology.

Source:

Chile Creates Large Marine Reserve at Sala y Gómez Island

<http://blogs.nationalgeographic.com/blogs/news/chiefeditor/2010/10/chile-creates-large-marine-res.html>

¹⁸⁵ Ecuador to Join the UN Convention on the Law of the Sea

Military Implications:

It is likely that Peru, another non-signatory of UNCLOS, will follow Ecuador regarding accession to the Convention, leaving only Venezuela in the Americas as a non-signatory, and making almost the entire Pacific coast Party to the Convention, with the exception of Colombia, El Salvador, and the U.S. Therefore, military organizations operating in this part of the Pacific should be prepared to comply with the UNCLOS requirements along the relevant coasts.

Source:

Ecuador anuncia adhesión a la Convemar (text in Spanish)

<http://andes.info.ec/politica/ecuador-anuncia-adhesion-a-la-convemar-23938.html>

New Technologies

¹⁸⁷ Synthetic Biology Guidelines to Reduce Bioweapon Threats

Military Implications:

International military liaisons with security, health, and environmental responsibilities should be aware of these guidelines and share them with their counterparts to speed the day when international agreements are written to monitor and control synthetic biology.

Source:

Screening Framework Guidance for Providers of Synthetic Double-Stranded DNA

<http://www.phe.gov/Preparedness/legal/guidance/syndna/Documents/syndna-guidance.pdf>

¹⁸⁸ The EU Strengthens Legislation to Counter Cybercrime

Military Implications:

Military personnel with cyber security expertise should be asked for their suggestions on creation of a global cybersecurity strategy, agreements, and enforcement measures. Such suggestions could be shared with military counterparts to begin the formulation of international military cybersecurity positions that could be used for future treaty negotiations.

Sources:

Commissioner concerned about cyber-attacks on WikiLeaks

<http://euobserver.com/9/31409/?rk=1>

Commission to boost Europe's defences against cyber-attacks

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/10/1239&format=HTML&aged=1&language=EN&guiLanguage=en>

For a more secure Europe

http://ec.europa.eu/news/external_relations/101122_en.htm

Polution

¹⁹⁰ New EU Directive on Industrial Polution

Military Implications:

Military and security personnel deployed in the EU and with work related to industrial plants should be prepared to comply with the new Directive within the provisions of Status of Forces Agreements. It is also fair to speculate that new regulations will be expanded to any relevant production areas. In the meantime, the BAT offers opportunities to introduce innovations in environmental technologies across operations and installations.

Sources:

EU adopts stricter rules on industrial emissions

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/10/1477&format=HTML&aged=0&language=EN&guiLanguage=en>

The IPPC Directive

<http://ec.europa.eu/environment/air/pollutants/stationary/ippc/summary.htm>

Waste Management

¹⁹² Kenya to Implement E-Waste Management Program

Military Implications:

AFRICOM should liaise with e-waste experts and this Kenyan initiative. It is reasonable to assume that Kenya's example will stimulate other African countries to create their own e-waste regulations; hence, military and security organizations along with their contractors should plan to have compatible e-waste procedures.

Source:

UNEP backs action on e-waste in East Africa

http://www.unep.org/Documents.Multilingual/Default.Print.asp?DocumentID=647&ArticleID=6744&l=en&WT.rss_f=pr&WT.rss_a=647-6744

PROPOSED TREATIES AND/OR CHANGES TO EXISTING ONES

Biological Diversity

¹⁹⁵ Prosecution of Pillage of Natural Resources as War Crime

Military Implications:

Since “conflict minerals” pillage is more likely to occur in vulnerable or conflict areas, the military might be called upon to help enforce the relevant regulations locally, as well as to report and stop breaches. Additional training requirements should be explored for personnel likely to be deployed in such areas.

Sources:

Firms Linked to Conflict Minerals May Face Prosecution

<http://www.ens-newswire.com/ens/jan2011/2011-01-03-02.html>

‘Conflict Mineral’ Strategy Emerging

http://wardsauto.com/ar/conflict_mineral_strategy_101228/

Digging In: Recent Developments on Conflict Minerals

<http://www.enoughproject.org/publications/digging-in-conflict-minerals>

Conflict minerals law could push prices higher - MSCI ESG

<http://www.miningweekly.com/article/conflict-minerals-law-could-push-prices-higher---mcsi-esg-2011-01-21>

¹⁹⁶ World’s Humid Tropical Forests to Suffer Considerable Biodiversity Change by 2100

Military Implications:

The study might trigger new regional or international conservation regulations, as well as increased enforcement of the existing ones. In addition to preparedness, relevant military personnel should increasingly include biological diversity and conservation into construction, training, and operations planning and encourage military-to-military exchanges for the transfer of best practices in environmental sustainability. Security organizations, worldwide, should consider being ready to support calls for advice and assistance from countries with “humid tropical forests” which are unable to address threats to their biodiversity. Providing security aid in maintaining national sovereignty of the “forest state” may result in special challenges.

Source:

Global Tropical Forests Threatened by 2100

http://carnegiescience.edu/news/global_tropical_forests_threatened_2100

¹⁹⁷ Biosafety Regulations Reviewed in Context of Worrying Forecasts

Military Implications:

Increased coherence among biodiversity agreements, UN-related bodies, and capacity building should lead to greater attention being paid to biodiversity impacts of military training and other operations. Military liaisons should explore opportunities for cooperation and applications of the Army Strategy for the Environment as this integration evolves with monitoring and enforcement

organizations. Also, military and other security personnel should anticipate increased adherence to the concept of calculating the environmental footprint internationally and an increased number of protected regions. Brazil and India have already stated they will integrate valuations of nature's services into their national economic frameworks, and the EU is prepared to support other developing nations who would like to do the same.

Sources:

Fifth meeting of the Cartagena Protocol on Biosafety. 11-15 October, 2010

<http://www.iisd.ca/vol09/enb09528e.html>

Nagoya 2010: Report puts economic value of nature on the global political radar

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=649&ArticleID=6791&l=en>

Living Planet Report 2010

<http://www.footprintnetwork.org/press/LPR2010.pdf>

¹⁹⁸ **New Protected Areas Proposed in the Pacific**

Military Implications:

Maps of these proposed areas should be reviewed for impacts on military operations.

Sources:

Blueprint to protect the future of Australia's oceans revealed

<http://www.physorg.com/news/2010-11-blueprint-future-australia-oceans-revealed.html>

Island nation announces Ukraine-sized sanctuary for whales and dolphins

http://news.mongabay.com/2010/1024-hance_mammal_sanctuary.html

Chemical and Biological Safety

²⁰⁰ **International Biosecurity Initiative**

Military Implications:

Military and security personnel with biosecurity-related responsibilities should review this legislation, follow its legislative progress, and explore its implications with their international counterparts for reducing the full range of international biosecurity threats and improving the use of nanosensor and other networks (some of which have been referenced in these monthly reports).

Sources:

Bill: To improve the international strategy of the United States for monitoring, reducing, and responding to biological risks, and for other purposes.

<http://www.govtrack.us/congress/bill.xpd?bill=h111-6297>

Bill Would Establish Global Biosecurity Body

http://gsn.nti.org/gsn/nw_20101005_4535.php

H.R. 5498: WMD Prevention and Preparedness Act of 2010

<http://www.govtrack.us/congress/bill.xpd?bill=h111-5498>

²⁰¹ Synthetic Biology Guidelines to Reduce Bioweapon Threats*Military Implications:*

International military liaisons with security, health, and environmental responsibilities should be aware of these guidelines and share them with their counterparts to speed the day when international agreements are written to monitor and control synthetic biology.

Source:

Screening Framework Guidance for Providers of Synthetic Double-Stranded DNA

<http://www.phe.gov/Preparedness/legal/guidance/syndna/Documents/syndna-guidance.pdf>

²⁰² New Regulations for Chemicals in California*Military Implications:*

It is fair to speculate that California's chemicals initiatives may set a precedent and be emulated by other states and at international levels. Military personnel with procurement responsibilities should monitor progress and ensure compliance with pending regulations and be prepared for additional restrictions.

Source:

California Issues New Green Chemistry Requirements for Consumer Products

<http://www.mofo.com/files/Uploads/Images/100915-Green-Chemistry-Requirements.pdf>

Copper in brake pads out to protect water, fish

<http://www.signonsandiego.com/news/2010/aug/28/copper-brake-pads-out-protect-water-fish/>

GREENHOUSE GAS EMISSIONS**Post-Kyoto Protocol and Post-Copenhagen Negotiations***Military Implications:*

[Same to all on this issue] The military should identify all resources and programs for reducing GHGs and responding to effects of climate change, update information continuously, forecast how it might be called upon for both mitigation and adaptation, and perform a gap analysis in anticipation of future requests. International discourse over climate change is increasing the development of international policies and strategies to mitigate and adapt to climate change.

*Sources:***²⁰⁵ November 2010**

Update on CO₂ emissions. Nature Geoscience, 21 November 2010, doi:10.1038/ngeo1022

<http://www.nature.com/ngeo/journal/vaop/ncurrent/full/ngeo1022.html>

United Nations Climate Change Conference Cancun - COP 16 & CMP 6

<http://unfccc.int/2860.php>

²⁰⁶ **October 2010**

The current state of affairs in the climate change negotiations leading up to COP16

<http://www.jiqweb.org/images/stories/JIQmagazine/2010Oct.pdf>

International Climate Policy after Copenhagen: Towards a 'Building Blocks' Approach

<http://onlinelibrary.wiley.com/doi/10.1111/j.1758-5899.2010.00045.x/full>

World Gobbling Up Greenhouse Gas Budget: WWF

<http://planetark.org/wen/59777>

²⁰⁷ **September 2010**

Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol

Fourteenth session, Tianjin, 4–9 October 2010

<http://unfccc.int/resource/docs/2010/awg14/eng/12.pdf>

²⁰⁸ **August 2010**

UNFCCC Executive Secretary: Governments make progress towards deciding shape of result at UN Climate Change Conference in Mexico, but need to narrow down number of negotiating options

http://unfccc.int/files/press/news_room/press_releases_and_advisories/application/pdf/pr_20100608_closing_awg_aug.pdf

Climate Change Dominates Pacific Island Forum Meeting

<http://climate-l.org/2010/08/04/climate-change-dominates-pacific-island-forum-meeting/?referrer=climate-l.org-daily-feed>

²⁰⁹ **July 2010**

World Investment Report 2010

<http://www.unctad.org/Templates/WebFlyer.asp?intItemID=5535&lang=1>

Environmental and economic effects of the Copenhagen pledges and more ambitious emission reduction targets

<http://www.uba.de/uba-info-medien/3998.html>

Study Warns that Decisions Made Today About Carbon Emissions Will Have Consequences "In the Coming Centuries and Millennia"

<http://www.wfblogs.org/climate/content/nrc-climatereport-16july2010>

²¹⁰ **Cancún UN Climate Change Conference Consolidates Progress**

Military Implications:

The Cancún Agreements set conditions for increased accountability concerning emission reductions and adaptation actions. Relevant military personnel should review the "Cancún Agreements" to identify opportunities for implementing the Army Strategy for the Environment, military-to-military activities to build adaptation capacities, and to ensure that units and contractors respect host countries' climate policies.

Sources:

The outcome documents of the COP16:

http://unfccc.int/conference_documents/items/5776.php

Back from the brink

<http://www.economist.com/node/17730564>

An Ethical Analysis of the Cancun Climate Negotiations Outcome.

<http://rockblogs.psu.edu/climate/2010/12/an-ethical-analysis-of-the-cancun-climate-negotiations-outcome.html>

²¹¹ **International Civil Aviation Pact Cuts Climate Emissions from Aircraft**

Military Implications:

Although the regulation concerns only civil aviation, military and security organizations should explore these conclusions as potentially leading to future impacts on their own operations.

Sources:

ICAO Member States Agree to Historic Agreement on Aviation and Climate Change

<http://www2.icao.int/en/Assembly37newsroom-public/Documents/ICAO%20Member%20States%20Agree%20To%20Historic%20Agreement%20On%20Aviation%20And%20Climate%20Change.pdf>

Civil Aviation Pact Cuts Climate Emissions from Aircraft

<http://www.ens-newswire.com/ens/oct2010/2010-10-13-02.html>

ICAO Environmental Report 2010

www.icao.int/icao/en/env2010/pubs/environmentreport_2010.pdf

²¹² **More Aggressive Action Needed to Curb Ozone Depletions**

Military Implications:

It is likely that the new Assessment will accelerate negotiations for a ban and implementation of regulations banning ozone-depleting chemicals. The military and its contractors should prepare to comply with new strictures and other chemicals' phase-outs.

Sources:

The 2010 Assessment of the Scientific Assessment Panel

http://ozone.unep.org/Assessment_Panels/SAP/Scientific_Assessment_2010/index.shtml

Ozone Secretariat Releases 2010 Scientific Assessment Report

<http://climate-l.iisd.org/news/ozone-secretariat-releases-2010-scientific-assessment-report/?referrer=climate-change-daily-feed>

New Technologies

²¹⁴ **Reports Assessing Several Nations' S&T Advances**

Military Implications:

As the DIA requested and sponsored the NRC report, they should ensure it is widely disseminated throughout the military community, particularly to personnel with environmentally-specific, S&T or JBRICS duties.

Sources:

S&T Strategies of Six Countries: Implications for the United States

http://www.nap.edu/catalog.php?record_id=12920

U.S. Risks Losing Global Leadership in Nanotech

<http://www.kurzweilai.net/u-s-risks-losing-global-leadership-in-nanotech>

Nanotechnology

²¹⁶ ISO Published Standard for Inhalation Toxicity Testing of Nanoparticles

Military Implications:

This standard should be used in the planning and operation of systems for nanotech risk assessment and use.

Sources:

How toxic are nanoparticles? New ISO standard helps find out

<http://www.nanowerk.com/news/newsid=19862.php>

ISO 10808:2010 Nanotechnologies -- Characterization of nanoparticles in inhalation exposure chambers for inhalation toxicity testing

http://www.iso.org/iso/catalogue_detail?csnumber=46130

²¹⁷ ISO Publishes Methodology for Nanomaterials Classification

Military Implications:

Personnel concerned with nanotechnology should become familiar with this work, as it will presumably become a standard for communications in the field.

Source:

New ISO methodology demystifies nanomaterials

<http://www.nanowerk.com/news/newsid=17691.php>

²¹⁸ The Geopolitics of Nanotech

Military Implications:

The report might be a good source of information on the present worldwide state of affairs of nanotechnology.

Source:

The Big Downturn? Nanogeopolitics

<http://www.etcgroup.org/en/node/5245>

²¹⁹ Organizations Address Key Issues For Nanomaterial Definition

Military Implications:

These guidelines are likely to have a substantial effect on the formulation of the nanomaterial definition used in future regulations, and should be taken into account in planning for such regulation.

Sources:

International Council of Chemical Associations addresses key issues for nanomaterial definition

<http://www.nanowerk.com/news/newsid=19145.php>

ICCA Core Elements of a Regulatory Definition of Manufactured Nanomaterials

http://www.icca-chem.org/ICCADocs/Oct-2010_ICCA-Core-Elements-of-a-Regulatory-Definition-of-Manufactured-Nanomaterials.pdf

Reply form for the public consultation on Proposal for a Commission definition of the term "nanomaterial"

http://www.ciel.org/Publications/Nanomaterials_ReplyForm_Nov10.pdf

²²⁰ EC Publishes Report on Definition of Nanomaterials For Regulatory Purposes

Military Implications:

Military personnel concerned with nanotech regulation should follow the evolution of the European discourse on the definitional questions and eventually provide input. This process might set a precedent to be emulated worldwide, and trigger new regulations accordingly.

Sources:

Considerations on a definition of nanomaterial for regulatory purposes

<http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/14270/1/jrc-refreport-definition-nanomaterial-eur24403en.pdf>

European Commission publishes reference report on definition of nanomaterials for regulatory purposes

<http://www.nanowerk.com/news/newsid=17008.php>

Document: Scientific Basis for the Definition of the Term "Nanomaterial"

http://ec.europa.eu/health/scientific_committees/emerging/docs/scenih_r_o_030.pdf

Public consultation on scientific basis for a definition of the term 'nanomaterial'

<http://www.nanowerk.com/news/newsid=17175.php>

²²¹ EC Committee Presents Scientific Basis for the Definition of "nanomaterial"

Military Implications:

This definition is a difficult but key point that lies at the foundation of much nanotech regulatory activity. ES personnel concerned with this area should review the paper.

Sources:

EU scientific committee publishes opinion on definition of nanomaterials

<http://www.nanowerk.com/news/newsid=19377.php>

Scientific Basis for the Definition of the Term "nanomaterial"

http://ec.europa.eu/health/scientific_committees/emerging/docs/scenih_r_o_032.pdf

²²² EU Gearing Up for Active Nanotech Regulatory Year in 2011

Military Implications:

Organizations concerned with nanotech EHS should be preparing for a large amount of regulatory study, discussion, and activity in Europe in 2011.

Source:

Regulation of products containing nanomaterial: Traceability, a pre-condition to acceptability
<http://www.nanowerk.com/news/newsid=18061.php>

²²³ EU Gearing Up for Active Nanotech Regulatory Year in 2011

Military Implications:

Organizations concerned with nanotech EHS should be preparing for a large amount of regulatory study, discussion, and activity in Europe in 2011.

Source:

Regulation of products containing nanomaterial: Traceability, a pre-condition to acceptability
<http://www.nanowerk.com/news/newsid=18061.php>

²²⁴ New Report Analyzes European Nanotech Issues

Military Implications:

This report provides a useful summary and analysis of a number of important nanotech issues from the European point of view.

Source:

NanoCode project published synthesis report on responsible development of nanotechnology
<http://www.nanowerk.com/news/newsid=18235.php>

²²⁵ New EU NanoSustain Project Aims for Sustainable Solutions for Nanotechnology

Military Implications:

This project should make substantial contributions to the field of nanotech risk assessment, and should be closely followed by all personnel concerned with those issues.

Sources:

New EU-funded project to develop sustainable solutions for nanotechnology-based products based on hazard characterization

<http://www.nanowerk.com/news/newsid=17326.php>

NanoSustain Project

<http://www.nanosustain.eu/>

²²⁶ EU Launches Public Consultation on Risk Assessment of Nanomaterials in Food

Military Implications:

Because of the probable influence of this document on the future course of ENM regulation in the EU, appropriate nanotech risk assessment personnel should review it and, if warranted, submit comments on it by the deadline of 25 February 2011.

Source:

European Food Safety Authority launches public consultation on risk assessment of nanomaterials in food and feed

<http://nanotech.lawbc.com/2011/01/articles/international/efsa-begins-public-consultation-on-draft-guidance-on-risk-assessment-for-nanoscience-and-nanotechnologies/>

²²⁷ German Paint Association Issues Nanomaterials Workplace Guidance*Military Implications:*

Although this is a highly specialized industrial application area, the guidelines document could offer useful insight into self-regulation in Europe of potentially hazardous nanomaterials workplace environments.

Sources:

German Paint and Printing Ink Association publishes guidance for workplace handling nanomaterials

<http://www.nanowerk.com/news/newsid=17345.php>

Guidance for the handling of nano-objects at the workplace

http://www.lackindustrie.de/Default2.asp?cmd=get_dwnld&docnr=127627&file=Nanoleitfaden+englisch%2Epdf

²²⁸ EPA Issues Final Significant New Use Rules (SNUR) on Carbon Nanotubes*Military Implications:*

Organizations involved with nanotube environmental health and safety (EHS) should review these modified rules to determine their effects on R&D, procurement, and operations. The modifications provide clarifications on exemptions from applicability of the SNUR, and additional human health and environmental summary information to support EPA's findings.

Sources:

75 FR 56880 - Multi-Walled Carbon Nanotubes and Single-Walled Carbon Nanotubes; Significant New Use Rules

<http://www.gpo.gov/fdsys/granule/FR-2010-09-17/2010-23321>

EPA Issues Final SNURs for Carbon Nanotubes

<http://nanotech.lawbc.com/2010/09/articles/united-states/federal/epa-issues-final-snurs-for-carbon-nanotubes/>

²²⁹ GAO Tells EPA It Should Expand Nanomaterials Info and Regulatory Efforts*Military Implications:*

The military should be prepared for potential additional regulations on the use of nanomaterials.

Sources:

Nanotechnology: Nanomaterials Are Widely Used in Commerce, but EPA Faces Challenges in Regulating Risk

<http://www.gao.gov/products/GAO-10-549>

EPA Should Expand Efforts to Get Data On, Regulate Nanomaterials, GAO Says in Report

<http://www.merid.org/nanodev/more.php?articleID=2708>

²³⁰ Discussion on Federal/State Regulation of Nanotech

Military Implications:

These discussions offer useful insights into the history, current state, and possible future course of state and federal regulation of nanotechnology.

Sources:

We Should Have Seen It Coming: States Regulating Nanotechnology

<http://www.nanotech-now.com/columns/?article=484>

State-level nano regulation: Yes, indeed, the industry "should have seen it coming" – it caused it!

<http://blogs.edf.org/nanotechnology/2010/09/10/state-level-nano-regulation-yes-indeed-the-industry-should-have-seen-it-coming-%E2%80%93-it-caused-it/>

²³¹ California Asks Manufacturers for Nano Analytical Test Measures

Military Implications:

The call is accompanied by a 102-page bibliography of chemical information on the nanomaterials of concern, which should be a very useful reference work for risk assessment.

Source:

CDTSC issues DCI for Nano Metals, Nano Metal Oxides, and Quantum Dots

<http://nanotech.lawbc.com/2010/12/articles/united-states/state/cdtsc-issues-dci-for-nano-metals-nano-metal-oxides-and-quantum-dots/>

Bibliography

http://www.dtsc.ca.gov/TechnologyDevelopment/Nanotechnology/upload/Round_Two_Biblio.pdf

²³² Thailand Moves Toward Nanotechnology Safety and Ethics Strategy Plan

Military Implications:

Appropriate EHS personnel in the region should offer the benefit of their experience to assist the authorities in this work and also become prepared for its eventual regulatory results.

Source:

Thailand pushing forward on nanosafety regulations

<http://www.nanowerk.com/news/newsid=19736.php>

²³³ Thailand to Introduce New "NanoQ" Certification Mark

Military Implications:

This move by Thailand may presage a wave of such efforts around the world to allay the fears of consumers regarding nanotech safety. (See related item Effort and Care Vital in Communicating Nanotech to the "Public", in this issue.) That raises the specter of future proliferation of different national standards/certifications, resulting in an impetus for an internationally coordinated system. (A foreshadowing of this kind of situation may be the current study by a Wisconsin Legislature committee of the possibility of state regulation of nanotech use.) ES personnel should also be considering the effect of such developments on the public's (including service members')

attitudes toward nanotechnology in applications other than consumer products. Further, this field could become fertile ground for unscrupulous vendors who claim but fail to properly follow even the voluntary standards. Military organizations using nanotech products could become liable for suppliers' ethical and technical failures, unless safeguards are established.

Source:

Thailand's first NanoQ

<http://www.asia-anf.org/NewsDetails.php?NewsId=218>

²³⁴ India Soon to Have a National Regulatory Framework for Nanotechnology

Military Implications:

The progress of this effort should be carefully monitored, since organizations working in India or cooperating with national enterprises will have to live with its results.

Source:

Soon, a national regulatory framework for nanotechnology

<http://timesofindia.indiatimes.com/city/pune/Soon-a-national-regulatory-framework-for-nanotechnology/articleshow/6750692.cms>

²³⁵ Pakistan Establishes National Nanotech Commission; Environment a Focus

Military Implications:

This new initiative by the government of Pakistan may offer opportunities for military-to-military cooperation in methods for the management of applying new technology to environmental security.

Source:

Pakistan is striving to grow in Nano technology field

<http://regionaltimes.com/06aug2010/moneynews/pakistan.htm>

²³⁶ India Soon to Have a National Regulatory Framework for Nanotechnology

Military Implications:

The progress of this effort should be carefully monitored, since organizations working in India or cooperating with national enterprises will have to live with its results.

Source:

Soon, a national regulatory framework for nanotechnology

<http://timesofindia.indiatimes.com/city/pune/Soon-a-national-regulatory-framework-for-nanotechnology/articleshow/6750692.cms>

²³⁷ Study Analyzes Stakeholder Preferences in Regulating Nanotechnology

Military Implications:

The results of this study should be taken into account in planning regulatory measures, and, in particular, in presenting them, and their justifications, to the stakeholders.

Sources:

Stakeholder Preferences in Regulating Nanotechnology

<http://www.nanowerk.com/spotlight/spotid=17337.php>

Multicriteria mapping of stakeholder preferences in regulating nanotechnology

<http://www.springerlink.com/content/x82lt46t86514361/>

²³⁸ ASTM Forms New Subcommittee on Nano-Enabled Consumer Products

Military Implications:

Appropriate environmental health and safety (ES) personnel should consider joining this subcommittee to lend their expertise to the effort and to keep abreast of developments in this standards area.

Source:

ASTM Nanotechnology Committee Creates Subcommittee on Nano-Enabled Consumer Products

<http://www.astmnewsroom.org/default.aspx?pageid=2270>

²³⁹ Nanotechnology Long-term Impacts and Research Directions: 2000-2020

Military Implications:

This material offers a comprehensive, forward-looking view of the entire field.

Sources:

Nanotechnology Long-term Impacts and Research Directions: 2000-2020

<http://www.wtec.org/nano2/>

²⁴⁰ What Can Nanotechnology Learn from Biotechnology?

Military Implications:

Military personnel concerned with the relationship between nanotechnology and society, and setting policy and communicating with the public on such issues, should consider reviewing the paper and the book.

Sources:

In the footsteps of biotech

<http://www.nature.com/nnano/journal/v5/n7/full/nnano.2010.136.html> (Subscription or purchase required)

What Can Nanotechnology Learn From Biotechnology?

http://www.elsevier.com/wps/find/bookdescription.cws_home/713890/description#description

²⁴¹ Report Outlines Nanotech Research Directions for Societal Needs in 2020

Military Implications:

This report, drawing on the opinions of leading experts from over 35 countries, should provide useful information for the long-range planning of nanotech assessment.

Sources:

Nanotechnology Research Directions for Societal Needs in 2020
<http://www.nanotechproject.org/events/archive/researchdirections/>
Nanotechnology Research Directions for Societal Needs in 2020
<http://sites.merid.org/nanodev/more.php?articleID=2986>

²⁴² International Handbook on Regulating Nanotechnologies*Military Implications:*

The Handbook could be a useful tool to those concerned with nano-related environmental health and safety regulatory issues, as well as effects of any restrictions on the material uses of nano-products.

Source:

International Handbook on Regulating Nanotechnologies
<http://2020science.org/international-handbook-on-regulating-nanotechnologies/>

²⁴³ Chemical Heritage Foundation Issues Two Reports on Nanotech Regulation*Military Implications:*

The reports should provide useful summaries of the current state of these aspects of the regulatory process.

Sources:

Emerging Nanotechnologies and Life-Cycle Regulation: An Investigation of Federal Regulatory Oversight from Nanomaterial Production to End of Life
<http://issuu.com/chemheritage/docs/emerging-nanotechnologies?viewMode=presentation&mode=embed>
Nanotechnology Regulation: Policies Proposed by Three Organizations for the Reform of the Toxic Substances Control Act
<http://issuu.com/chemheritage/docs/nanotechnology-regulation?viewMode=presentation&mode=embed>

²⁴⁴ Regulation of Products Containing Nanoscale Materials*Military Implications:*

This excellently detailed article provides a very useful summary of the course of nanotech regulation in the USA.

Sources:

Regulation of Products Containing Nanoscale Materials
<http://sites.merid.org/nanodev/more.php?articleID=2979>
Regulation of products containing nanoscale materials
<http://www.lexology.com/library/detail.aspx?g=4b460c16-b0cc-4c05-972d-c9b152cf3400>

²⁴⁵ Review of the Long History of Nanosilver Usage and Regulation, and Implications

Military Implications:

This point should be taken into account in considering regulatory actions on nanosilver, and reactions thereto.

Source:

Environmental Science & Technology Article Reviews History of Nanosilver and Policy Implications

<http://nanotech.lawbc.com/2011/01/articles/united-states/federal/environmental-science-technology-article-reviews-history-of-nanosilver-and-policy-implications/>

²⁴⁶ Voluntary Initiatives, Regulation, and Nanotechnology Oversight: Charting a Path

Military Implications:

The Project's five years of experience in the development of a number of voluntary initiatives in this area should ensure that this report offers valuable guidance to nanotech regulation planners.

Sources:

Voluntary Initiatives, Regulation, and Nanotechnology Oversight: Charting a Path

<http://www.nanotechproject.org/events/archive/voluntary/>

PEN 19 - Voluntary Initiatives, Regulation, and Nanotechnology Oversight

<http://www.nanotechproject.org/publications/archive/voluntary/>

²⁴⁷ Webinars on Nanotech Regulation Offered

Military Implications:

Relevant military personnel should consider subscribing to this offering.

Source:

Nanotechnology Today 2010 webinar

<http://www.khlaw.com/showevent.aspx?Show=3789>

²⁴⁸ New Book Addresses Nanotechnology Education and Workforce Training

Military implications:

This work may provide useful ideas on communicating nanotech knowledge and understanding to outside audiences.

Source:

New Book Addresses Nanotechnology Education and Workforce Training

<http://www.foresight.org/nanodot/>

²⁴⁹ Studies Discussing the Possibility of Understanding Nanotoxicology

Military Implication:

These studies provide valuable information to those planning nanomaterial development and risk assessment.

Sources:

Nanotoxicology myth buster

<http://www.nanowerk.com/spotlight/spotid=18774.php>

Debunking Some Misconceptions about Nanotoxicology. David B. Warheit, DOI:

10.1021/nl103432w

<http://pubs.acs.org/action/doSearch?action=search&author=warheit&qSearchArea=author&type=within&publication=40026042&> (Abstract)

"Study of nanoparticle emission of selected products during their life cycle" (English summary)

http://www.umweltbundesamt.de/technik-verfahren-sicherheit-e/publikationen/texte_52_2010_kurzfassung_e.pdf

²⁵⁰ **Management of Nanomaterials Safety in Research Environment**

Military Implications:

The article should offer insights into this institution's experience with this technique for risk management.

Source:

Management of Nanomaterials Safety in Research Environment

<http://sites.merid.org/nanodev/more.php?articleID=3034>

²⁵¹ **Bioethics Commission Calls for Enhanced Federal Oversight of Synthetic Biology**

Military Implications:

Military personnel with research responsibilities that could be affected by synthetic biology should be given this document to study. Those with direct responsibilities for synthetic biology should give special consideration to the report's recommendations, especially the seven cited above (1, 3, 5, 9, 11, 12, and 17).

Sources:

Presidential Commission on Bioethics calls for enhanced federal oversight of synthetic biology

<http://www.nanowerk.com/news/newsid=19449.php>

NEW DIRECTIONS. The Ethics of Synthetic Biology and Emerging Technologies

<http://www.bioethics.gov/documents/synthetic-biology/PCSBI-Synthetic-Biology-Report-12-16-10.pdf>

²⁵² **NRC Committee Recommends Sequence-based Tracking of Possible Pathogens**

Military Implications:

Those organizations with biological counter-warfare responsibilities should review this report for potential to improve policy and procedures.

Sources:

Sequence-Based Classification of Select Agents: A Brighter Line

http://www.nap.edu/catalog.php?record_id=12970

US report pins down future biosecurity. Committee recommends a sequence-based system for identifying pathogens

<http://www.nature.com/news/2010/100803/full/466678a.html>

²⁵³ **India Urges Strengthening Outer Space Treaty**

Military implications:

[Same as previous on similar issues] In addition to the DOD's Commercial and Foreign Entities program, the military should increase cooperation with military counterparts and civilian organizations around the world to explore joint research programs and design of a legal framework to increase space security.

Sources:

Plug holes in UN 'Outer Space Treaty', says former Air Chief

<http://news.oneindia.in/2011/01/19/plugholes-in-un-outer-space-treaty-says-former-airchief-aid0121.html>

Space, Science, and Security: The Role of Regional Expert Discussions New Delhi, January 19-21

<http://swfound.org/events/2011/space,-science,-and-security-the-role-of-regional-expert-discussions>

IMPROVED ENFORCEMENT OF ENVIRONMENTAL REGULATIONS

²⁵⁵ **“Public Interest” Environmental Suits Increasing**

Military Implications:

This is further evidence that military installation and training planners should increasingly consider public opinion on environmental issues before considering new projects, installations, training, etc.

Source:

Activists in India cry foul over new rules regarding public interest litigation

<http://www.washingtonpost.com/wp-dyn/content/article/2010/07/25/AR2010072502773.html>

²⁵⁶ **International Consortium Created to Curb Environmental Crime**

Military Implications:

AFRICOM and military personnel in other regions working in countries with governments with weak local customs or security organizations should consider how they might conduct military-to-military activities to help implement the intentions of the Consortium and explore cooperation on the full range of international environmental crime-related activities with the Consortium.

Sources:

World's police at INTERPOL General Assembly rally against environmental crime

<http://www.interpol.int/Public/ICPO/PressReleases/PR2010/News20101110.asp>

Powerful alliance to fight wildlife crime comes into effect

<http://www.interpol.int/Public/ICPO/PressReleases/PR2010/PR098.asp>

AG-2010-RAP-08, Appendix. Resolution: Subject: Sustainable Environmental Crime Programme

http://www.cites.org/eng/news/press/2010/20101108_Interpol_resolution.pdf

²⁵⁷ **The ICC to Establish an Independent Oversight Mechanism**

Military Implications:

Although the U.S. is not a State Party to the ICC, relevant military personnel should review the documents adopted by the 9th ASP, especially the ones specified above, which aim to strengthen the ICC and international criminal justice. They should be prepared to cooperate or comply, as required by status of forces agreements, in those countries that are States Party.

Sources:

9th Assembly of States Parties to the Rome Statute of the ICC, Official documents

<http://www.icc-cpi.int/nr/exeres/f16c9b3e-55a6-4989-8987-f57125a0d306.htm>

Assembly of States Parties concludes its ninth session

<http://www.icc->

[cpi.int/Menus/ASP/Press+Releases/Press+Releases+2010/Assembly+of+States+Parties+concludes+its+ninth+session.htm](http://www.icc-cpi.int/Menus/ASP/Press+Releases/Press+Releases+2010/Assembly+of+States+Parties+concludes+its+ninth+session.htm)

²⁵⁸ **Strategic Plan for Biodiversity to Connect UN Conventions and UN Bodies**

Military Implications:

Increased coherence among biodiversity agreements, UN-related bodies, and capacity building should lead to greater attention being paid to biodiversity impacts of military training and other operations. Military liaisons should explore opportunities for cooperation and applications of the Army Strategy for the Environment as this integration evolves with monitoring and enforcement organizations.

Sources:

First high level retreat among secretariats of biodiversity-related Conventions. 1 September 2010, Château de Bossey, Switzerland. Summary of the Retreat

<http://www.cbd.int/cooperation/doc/report-hlr-2010-09-01-en.pdf>

Ministerial forum calls for leadership for a new biodiversity vision for the twenty-first century

<http://www.cbd.int/doc/press/2010/pr-2010-09-03-minister-forum-geneva-en.pdf>

²⁵⁹ **UN Review of Sustainable Development in Preparation for Rio+20 in 2012**

Military Implications:

The Rio+20 conference could speed up some reforms of the UN system and raise environmental concerns on the international and national agendas, thus strengthening enforcement of environmental regulations. Military personnel involved in promoting the Army Strategy for the Environment should study the review of the implementations of Agenda 21 and the Barbados Programme of Action to identify potential applications for the Army Strategy for the Environment.

Sources:

The United Nations General Assembly advanced unedited copy of the Synthesis Report

<http://www.earthsummit2012.org/index.php/news/313-synthesis-report-231210>

First Intersessional Meeting for the UN Conference on Sustainable Development

http://www.uncsd2012.org/index.php?option=com_content&view=category&id=73&Itemid=124

²⁶⁰ **International Atomic Fuel Banks to Reduce Nuclear Proliferation**

Military Implications:

The military should explore the use of the enriched uranium reserves along with other initiatives as part of the continual assistance to countries for advancing nuclear disarmament and facilitate NPT negotiations and improve global nuclear safety.

Sources:

IAEA approves global nuclear fuel bank

http://www.world-nuclear-news.org/ENF-IAEA_approves_global_nuclear_fuel_bank-0612105.html

The first in the world guaranteed reserve of nuclear fuel has been set up in the Russian Federation

<http://www.rosatom.ru/wps/wcm/connect/rosatom/rosatomsite.eng/presscentre/news/6a376f8044e2e26db0bdfa6fd126209c>

Russia Inaugurates World's First Low Enriched Uranium Reserve

<http://www.iaea.org/newscenter/news/2010/leureserve.html>

²⁶¹ **Prosecution of Pillage of Natural Resources as War Crime**

Military Implications:

Since “conflict minerals” pillage is more likely to occur in vulnerable or conflict areas, the military might be called upon to help enforce the relevant regulations locally, as well as to report and stop breaches. Additional training requirements should be explored for personnel likely to be deployed in such areas.

Sources:

Firms Linked to Conflict Minerals May Face Prosecution

<http://www.ens-newswire.com/ens/jan2011/2011-01-03-02.html>

‘Conflict Mineral’ Strategy Emerging

http://wardsauto.com/ar/conflict_mineral_strategy_101228/

Digging In: Recent Developments on Conflict Minerals

<http://www.enoughproject.org/publications/digging-in-conflict-minerals>

Conflict minerals law could push prices higher - MSCI ESG

<http://www.miningweekly.com/article/conflict-minerals-law-could-push-prices-higher---mcsi-esg-2011-01-21>

²⁶² **Regional Cooperation in Africa to Counter Wildlife Trafficking**

Military Implications:

AFRICOM should explore how to assist such regional collaboration and build capacity to help enforcement of the Convention on International Trade in Endangered Species and the Convention against Transnational Organized Crime.

Sources:

Central Africa: four-nation ‘sting’ operation busts wildlife smuggling ring

<http://www.guardian.co.uk/environment/2010/dec/12/africa-wildlife-ivory-smuggling>

²⁶³ **Hazardous E-waste Grows as Major Environmental Problem**

Military Implications:

Military personnel and their civilian contractors with recycling and waste management responsibilities should review their classifications and operations to see if revisions are necessary. The reports of INECE should be circulated to these personnel.

Sources:

Global Crackdown on Illegal Hazardous Waste Shipping Confirms Benefits of Cross-Border Cooperation

<http://inecesecretariat.wordpress.com/2010/11/02/global-crackdown-on-illegal-hazardous-waste-shipping-confirms-benefits-of-cross-border-cooperation/>

INECE Seaport Environmental Security Network

www.inece.org/seaport

²⁶⁴ **Shipping Efficiency Database to Reduce Emissions from Maritime Transportation**

Military Implications:

The military should consider the shippingefficiency.org database for selecting contractors as part of reducing the environmental footprint of the Army in general and from shipping specifically.

Sources:

Shippingefficiency.org website

<http://www.shippingefficiency.org/>

Cleaning up shipping. New database to rate energy efficiency of ocean-going vessels

<http://thechronicleherald.ca/Business/1218898.html>

INTERNATIONAL STANDARDS WITH ENVIRONMENTAL SECURITY IMPLICATIONS

²⁶⁶ **Revised Standards Proposed for Corporate Greenhouse Gas Reporting**

Military Implications:

Military and their civilian contractors with GHG reporting responsibilities should review the revised standards and plan their appropriate compliance activities.

Sources:

New measures emerge for measuring carbon emissions, both corporate and municipal
<http://www.smartplanet.com/business/blog/business-brains/new-measures-emerge-for-measuring-carbon-emissions-both-corporate-and-municipal/11209/>

The GHG Protocol Initiative

<http://www.ghgprotocol.org/standards/product-and-supply-chain-standard>

²⁶⁷ **Comments Invited on EPA/DOT Proposed Heavy Truck Mileage/Emission Standards**

Military Implications:

These standards would have major effects on vehicular procurement. The proposal should be reviewed for its probable consequences, so that adequate planning can be instituted. Comments are invited by January 3, 2011.

Sources:

New Truck Emission Standards and Controls

http://www.enn.com/top_stories/article/41927

EPA and NHTSA Propose First-Ever Program to Reduce Greenhouse Gas Emissions and Improve Fuel Efficiency of Medium- and Heavy-Duty Vehicles: Regulatory Announcement

<http://www.epa.gov/otaq/climate/regulations/420f10901.htm>

²⁶⁸ **ISO Publishes Methodology for Nanomaterials Classification**

Military Implications:

Personnel concerned with nanotechnology should become familiar with this work, as it will presumably become a standard for communications in the field.

Source:

New ISO methodology demystifies nanomaterials

<http://www.nanowerk.com/news/newsid=17691.php>

²⁶⁹ **Fuel Efficiency Standards Are Changing around the World**

Military Implications:

It is fair to speculate that the UN procurement guidelines might be expanded to peacekeeping operations and therefore affect the military and its contractors. At the same time, fuel efficiency standards are increasing around the world, which increases the likelihood of global standards with assessment methodologies eventually affecting the military. The opportunity for military-to-military programs in fuel efficiency should be explored.

Sources:

Buying Better Vehicles for the UN

<http://www.greeningtheblue.org/news/buying-better-vehicles-un>

New report gives green light to the feasibility of halving carbon emissions from new cars by 2030

http://www.iea.org/index_info.asp?id=1775

Clean Transport Systems

http://ec.europa.eu/transport/urban/vehicles/road/clean_transport_systems_en.htm

RAND study concludes use of alternative fuels by US military would convey no direct military benefit; recommends energy efficiency instead

<http://www.greencarcongress.com/2011/01/rand-20110125.html>

²⁷⁰ International Air Cargo Screening Cooperation Requested

Military Implications:

Where possible, relevant military entities should share multi-purpose sensors and related screening technology with negotiators to improve forthcoming international standards for air cargo screening.

Source:

TSA Wants Countries to Cooperate on Air Cargo Screening: Industry Official

http://gsn.nti.org/gsn/nw_20110124_5589.php

²⁷¹ New Earth-Approaching Asteroid Discovered

Military Implications:

Space objects of approximately 150 ft. in diameter colliding with Earth can eliminate life within an 800-mile radius of impact. Continued vigilance and international cooperation regarding space security should remain a high priority for military and related security personnel.

Sources:

Pan-STARRS discovers its first potentially hazardous asteroid

<http://www.physorg.com/news204826766.html>

Pan-STARRS

<http://pan-starrs.ifa.hawaii.edu/public/>

²⁷² Hungary Industrial Plant Spill Might Trigger Tougher Environmental Regulations

Military Implications:

The Ajka spill will probably raise questions regarding proper implementation and enforcement of Europe's Seveso II Directive that includes legislation on the storage of dangerous substances and chemical safety management systems. EUCOM and NATO personnel should consider supplementing the EU's inspection capability of industrial facilities in Europe both for assessing this instance's pollution rate, as well as to be prepared for likely tougher enforcement.

Sources:

The Danube's menacing industrial legacy

<http://www.theglobeandmail.com/news/world/europe/the-danubes-menacing-industrial-legacy/article1759897/>

Danube Largely Safe Despite Toxicity of Hungarian Spill

<http://www.spiegel.de/international/europe/0,1518,722100,00.html>

UN sends experts to Hungary to help assess health impact of sludge spill

<http://www.un.org/apps/news/story.asp?NewsID=36414&Cr=health&Cr1=>

²⁷³ **Study Indicts Swimming Pool Disinfectants for Toxic Effects from Byproducts**

Military Implications:

These results suggest a thorough reexamination by preventive health agencies of disinfection procedures for recreational facilities in installation environments.

Source:

Recreational Pool Disinfectants Linked to Health Problems

<http://www.sciencedaily.com/releases/2010/07/100721133213.htm>

Genotoxicity of Water Concentrates from Recreational Pools after Various Disinfection Methods

<http://pubs.acs.org/doi/abs/10.1021/es903593w>

²⁷⁴ **Artificial Grass May Pose Threat of Lead Poisoning to Children**

Military Implications:

Military installations with artificial turf should be notified to evaluate this problem and to institute remedial measures, if necessary.

Sources:

Warning of threat to children posed by artificial grass

<http://www.heraldscotland.com/news/health/warning-of-threat-to-children-posed-by-artificial-grass-1.1062033>

Evaluating and Regulating Lead in Synthetic Turf

<http://ehp03.niehs.nih.gov/article/fetchArticle.action;jsessionid=603B9732578818DD76D9060DCB31669A?articleURI=info%3Adoi%2F10.1289%2Fehp.1002239>

²⁷⁵ **China to Expand Weather Control Program**

Military Implications:

These activities will provide additional data on the consequences of such measures, and should be monitored, especially if they are a precursor to larger-scale geoengineering proposals and prove safe to apply to drought-prone areas that otherwise might force migrations that could lead to conflict.

Source:

China to step up efforts to control Mother Nature

<http://www.physorg.com/news/2010-12-china-efforts-mother-nature.html>

Nanotechnology--Potential Environmental and Health Implications

²⁷⁷ **Study Raises Doubts on PEN Nano Consumer Products Inventory (CPI)**

Military Implications:

Military personnel concerned with nanotech risk evaluation should examine the allegations in the article, and their stated justifications, including the authors' professional qualifications, and

determine if any additional caution is needed in using data from the CPI. They should also consider the merits of the recommendation for a government-prepared inventory.

Source:

Project on Emerging Nanotechnologies – Consumer Product Inventory Evaluated
Nanotechnology Law & Business (Volume 7, Issue 2)

<http://www.nanolabweb.com/index.cfm/action/main.default.viewArticle/articleID/330/CFID/4996510/CFTOKEN/43195139/index.html> (abstract; subscription or purchase required for full text)

²⁷⁸ Lack of Nanoparticle Characterization Obstructs Development of Nanomedicines

Military Implications:

The environmental security community should take very serious note of these opinions, as the negative consequences of these information gaps apply equally to the use of nanomaterials in products other than medicines. Every effort should be made to improve the states of characterization technology and nano/bio interaction studies.

Source:

Tiny traits cause big headaches. Nanotech medicines held up by lack of particle characterization.

<http://www.nature.com/news/2010/100914/full/467264b.html>

²⁷⁹ Structured Relationship Modeling Allows Prediction of Nanoparticle Properties

Military Implications:

If this technique lives up to its promise, it should prove of considerable assistance in designing new nanoparticles and assessing their risks.

Sources:

Predicting the toxicological effects of nanomaterials with novel modeling approach

<http://www.nanowerk.com/spotlight/spotid=18875.php>

Quantitative Nanostructure–Activity Relationship Modeling

<http://dx.doi.org/doi:10.1021/nm1013484>

²⁸⁰ Sunscreens with ZnO, TiO₂ Nanoparticles May Pose Health Risk

Sources:

Toxicological Aspects of Long-Term Treatment of Keratinocytes with ZnO and TiO₂ Nanoparticles

<http://www.merid.org/nanodev/more.php?articleID=2889>

Toxicological Aspects of Long-Term Treatment of Keratinocytes with ZnO and TiO₂ Nanoparticles

<http://onlinelibrary.wiley.com/doi/10.1002/sml.201000032/abstract> (abstract)

²⁸¹ Study Shows TiO₂ Nanoparticles Disrupt Aquatic Ecosystems

Military Implications:

These results should be taken into account in environmental risk assessments of the very wide range of products using TiO₂ nanoparticles. A review of the paper also points out that this toxicity, "...could have a potential application: Water purification processes based on nTiO₂ could limit growth of cyanobacteria in closed water systems, such as cooling towers and boilers."

Sources:

TiO₂ Nanoparticles in the Environment

<http://sites.merid.org/nanodev/more.php?articleID=2909>

TiO₂ Nanoparticles in the Environment (study)

<http://pubs.acs.org/cen/news/88/i40/8840news5.html>

²⁸² New Model Predicts Nanoparticle Cellular Toxicity

Military Implications:

According to Meridian Nanotechnology and Development News, "The model could help regulators streamline and prioritize nanotoxicology testing, especially since nanoparticle use is growing faster than toxicology can keep up." It could also be a tool for military R&D agencies and preventive health organizations.

Source:

Predicting Nanoparticle Toxicity

<http://www.rsc.org/chemistryworld/News/2010/July/26071001.asp>

²⁸³ Transatlantic Partners to Analyze Environmental Safety and health (EHS) for Manufactured Nanomaterials

Military Implications:

Components concerned with nanotech EHS should establish liaison with the institutions involved with this effort, to follow the results obtained.

Sources:

Transatlantic partners to analyse environment and health risks of manufactured nanomaterials

<http://www.nanowerk.com/news/newsid=19871.php>

²⁸⁴ Toxicity of Silver Nanoparticles Increases During Storage

Military Implications:

This line of research needs to be closely followed because of its consequences for the accuracy of nanotech risk assessment.

Sources:

Toxicity of Silver Nanoparticles Increases during Storage Because of Slow Dissolution under Release of Silver Ions

<http://pubs.acs.org/doi/abs/10.1021/cm100023p>

Toxicity of silver nanoparticles increases during storage

<http://www.nanowerk.com/spotlight/spotid=17687.php>

²⁸⁵ Some Types of Nanotubes Produce Harmful Oxygen in Sunlit Water

Military Implications:

These findings need to be taken into account in risk assessment of SWNTs, especially if there is a possibility of their appearance in sunlit aqueous environments.

Sources:

Photoreactivity of Carboxylated Single-Walled Carbon Nanotubes in Sunlight: Reactive Oxygen Species Production in Water

<http://pubs.acs.org/doi/abs/10.1021/es101073p> (Abstract; full text by subscription)

Shining A Light On Nanotoxicity

<http://pubs.acs.org/cen/news/88/i33/8833news5.html>

²⁸⁶ Nanosilver Compound Turns Up in Municipal Wastewater

Military Implications:

These findings once again emphasize the requirement for extensive continuing research into the environmental connections in the life cycle of nanoproducts and derivatives, from original production through use, discard, and eventual disposal; as, for example, an ingredient in sludge used for agricultural fertilization. An indication of the uncertain situation in this regard is the recent appeal by the National Association of Clean Water Agencies asking the EPA not to conditionally approve the use of nanoscale silver as a preservative in textile products as it does not have the scientific basis to conclude the use would not cause harm.

Sources:

Sludging through the nano lifecycle: Caution ahead

<http://blogs.edf.org/nanotechnology/2010/09/23/sludging-through-the-nano-lifecycle-caution-ahead/>

Discovery and Characterization of Silver Sulfide Nanoparticles in Final Sewage Sludge Products

<http://pubs.acs.org/doi/abs/10.1021/es101565j>

²⁸⁷ French Lab to Be Set up for Study of Nanotube Toxicity in Aqueous Environments

Military Implications:

Components dealing with nanotech risk assessment should establish liaison with this laboratory after it begins operations, in order to be able to profit from the results of its research.

Source:

NAUTILE: the first research laboratory for the study of the ecotoxicity of carbon nanotubes in the aquatic environment

http://prodawl.arkema.com/sites/group/en/press/pr_detail.page?p_filepath=/templatedata/Content/Press_Release/data/en/2010/100910_nautille_the_first_research_laboratory_for_the_study_of_the_ecotoxicity_of_carbon_nanotubes.xml

²⁸⁸ Mouse Model Shows Reversible Reproductive Damage from Nanotubes

Military Implications:

The further research necessary in this area of nanotech EHS should be strongly encouraged.

Source:

No nanotube fertility risk

<http://www.rsc.org/chemistryworld/News/2010/August/08081002.asp>

²⁸⁹ Scientific Review on Using Nanomaterials in Construction Materials

Military Implications:

This report provides useful guidance for anyone dealing with the use of manufactured nanomaterials in construction.

Sources:

Nanomaterials in the construction industry and resulting health and safety issues

<http://www.nanowerk.com/spotlight/spotid=17138.php>

Nanomaterials in the Construction Industry: A Review of Their Applications and Environmental Health and Safety Considerations

<http://pubs.acs.org/doi/abs/10.1021/nm100866w>

²⁹⁰ Use of TiO₂ Nanoparticles in City Pavement Raises Risk Questions

Military Implications:

The use of TiO₂ nanoparticles should be viewed with extreme caution until their environmental risk is much better understood.

Source:

TiO₂ nanoparticles-containing materials in our cities: Impacts are difficult to predict

<http://www.physorg.com/news/2010-11-tio2-nanoparticles-containing-materials-cities-impacts.html>